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APPENDIX TO THE REPORT OF THE MINISTER OF AGRICULTURE

EXPERIMENTAL FARMS

REPORTS

OF THE

DIRECTOR	Wm. SAUNDERS, C.M.G., LL.D.
AGRICULTURIST	J. H. GRISDALE, B. Agr.
HORTICULTURIST	W. T. MACOUN
CHEMIST	F. T. SHUTT, M.A.
ENTOMOLOGIST and BOTANIST	JAS. FLETCHER, LL.D.
CEREALIST	C. E. SAUNDERS, Ph.D.
POULTRY MANAGER	A. G. GILBERT
SUPT. EXPERIMENTAL FARM, Nappan, N.S.	R. ROBERTSON
HORTICULTURIST " " "	W. S. BLAIR
SUPT. EXPERIMENTAL FARM, Brandon, Man.	S. A. BEDFORD
" " " Indian Head, Sask.	ANGUS MACKAY
" " " Agassiz, B.C.	THOS. A. SHARPE

FOR

1905

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OTTAWA
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APPENDIX

TO THE

REPORT OF THE MINISTER OF AGRICULTURE

ON

EXPERIMENTAL FARMS

OTTAWA, December 1, 1905.

SIR,—I beg to submit for your approval the nineteenth annual report of the work done, and in progress, at the several experimental farms.

In addition to my report, you will find appended reports from the following officers of the Central Experimental Farm:—From the Agriculturist, Mr. J. H. Grisdale; from the Horticulturist, Mr. W. T. Macoun; from the Chemist, Mr. Frank T. Shutt; from the Entomologist and Botanist, Dr. James Fletcher; from the Cerealist, Dr. C. E. Saunders, and from the Poultry Manager, Mr. A. G. Gilbert.

From the Branch Experimental Farms there are reports from Mr. R. Robertson, Superintendent, and from Mr. W. S. Blair, Horticulturist of the Experimental Farm for the Maritime Provinces, at Nappan, Nova Scotia; from Mr. S. A. Bedford, Superintendent of the Experimental Farm for Manitoba at Brandon; from Mr. Angus Mackay, Superintendent of the Experimental Farm for the North-west Territories, at Indian Head, and from Mr. Thomas A. Sharpe, Superintendent of the Experimental Farm for British Columbia, at Agassiz.

In these reports there will be found the results of many important and carefully conducted experiments in agriculture, horticulture and arboriculture, the outcome of practical and scientific work in the fields, barns, dairy and poultry buildings, orchards and plantations at the several experimental farms; also of scientific research in connection with the breeding of cereals and in determining their relative value; also of research work in the chemical laboratories bearing on many branches of agricultural and horticultural employment and of information gained from the careful study of the life histories and habits of injurious insects and the methods by which noxious weeds are propagated and spread, together with the most practical and economical measures for their destruction. In the report of the Entomologist and Botanist will also be found particulars of the experiments and observations which have been made during the past year in connection with the Apiary.

The large and constantly increasing demand by the farmers of the Dominion for the publications issued from the experimental farms, the rapidly extending correspondence and the readiness shown by farmers everywhere to co-operate with the work of the farms in the testing of new and promising varieties of cereals furnish gratifying evidence of the desire for information and improvement among this class of the community, also of the high esteem in which the work of the farms is held. It is hoped that the facts brought together in the present issue will be found of much practical value to the Canadian farmer and fruit-grower, and that they may assist in advancing agriculture and horticulture in this country.

I have the honour to be, sir,
Your obedient servant,

WM. SAUNDERS,
Director of Experimental Farms.

To the Honourable,
The Minister of Agriculture,
Ottawa.

ANNUAL REPORT OF THE EXPERIMENTAL FARMS

REPORT OF THE DIRECTOR

(WM. SAUNDERS, C.M.G., LL.D., F.R.S.C., F.L.S.)

1905

Canadian farmers have been blessed with another bountiful harvest, and the crops gathered have been very satisfactory over almost the whole of the settled parts of the Dominion.

On the Pacific coast the hay crop, which is one of great importance in the coast climate of British Columbia, has been unusually large, and has been saved in good condition. Oats, probably the next largest crop in that province, have given a heavy yield of excellent grain. Barley, pease, Indian corn, and field roots have all done well. Wheat, which, however, occupies but a small area there has given a crop below the average, owing to the prevalence of the wheat midge *Diplosis tritici.*

The fruit crop, which is fast becoming an important one in that province, has on the whole been satisfactory. Apples, pears and plums have produced in most localities a medium crop, and in some districts the yield has been a heavy one. Small fruits of all sorts have done well.

The production of butter, also of poultry and eggs is increasing, and hop growing is being extended with profitable results.

In Alberta there is a large and rapidly increasing area devoted to spring wheat and oats. The cultivation of winter wheat is also being greatly extended, while barley and other useful crops occupy smaller areas. All these have given very satisfactory returns during the season of 1905. The beet sugar factory at Raymond, in Southern Alberta, has had a good season, and a large quantity of sugar beets of excellent quality has been worked. The dairy interests in Northern Alberta are also advancing, and a large quantity of butter has been exported during the past year. New settlers are flocking in to all those parts which are being opened up by railways, and this accession of population will soon result in a very large increase in the area of land under cultivation.

The crops in Saskatchewan have never been better. Many new districts have been opened up, and large crops of wheat grown in localities where a few years ago the land was passed over by settlers as unpromising for wheat growing. Throughout these western provinces grain this year of all sorts was excellent in yield and quality, and was practically all cut before frost occurred.

In Manitoba also a large harvest has been gathered of grain of high quality, which has given an enduring stimulus to business of all sorts, and placed farmers generally in a comfortable position. The larger part of the wheat harvested has graded No. 1 Northern, while oats and barley have given crops of unusual weight and quality. The stock and dairy interests are also making satisfactory progress.

In Ontario the hay has been an unusually heavy crop, well above the average. The same may be said of fall and spring wheat, oats and barley, all of which are now important crops in this province. Field roots and Indian corn have given about an average return.

Pastures have made fair to good growth during the summer and fall, and all classes of live stock are in good condition. Apples have been a medium crop and have commanded good prices, while pears, plums, peaches and grapes have yielded well.

In the western counties of Quebec, where the rainfall has been sufficient, hay has yielded abundantly, and owing to the rich pasturage the dairy industry has flourished, and field crops of all sorts have given satisfactory returns. The eastern counties have suffered somewhat from drought, and there the crops have been lighter and the dairy output has been lessened owing to inferior pastures.

In the Maritime Provinces the hay crop as a whole is said to have been above the average, while oats have given a fair average return; wheat and barley also have done well. The early part of the season was cold and wet, and seeding was delayed. Later the weather was very favourable and crops matured rapidly. In September dry weather set in, which prevented the usual growth in field roots and the drought brought many crops which promised to be heavy down to an average or less than an average yield.

In the fruit producing districts the apple crop was a very fair one, the fruit was large and of excellent quality and has realized good prices.

Upon the progress of farming in all sections of Canada the experimental farms continue to exercise a weighty influence. The results of nineteen years of ceaseless inquiry into the needs of farmers in all parts of the country has resulted in the accumulation of volumes of information and experience which are placed within reach of all, who need them. Instruction and information have been given out on every hand covering every branch of agriculture and horticulture. Reports and bulletins have been sent in thousands and tens of thousands, in response to inquiries from earnest seekers after information from all parts of the country. The knowledge acquired by long experience, close observation and careful study has been spread over the whole Dominion, and none need dwell in ignorance as to the best methods to adopt to render their work successful. Correspondence with farmers has been encouraged and many thousands of letters have been written by the officers of the farms in response to inquiries on special subjects. Many meetings of farmers held in the different provinces of the Dominion have been attended by farm officers, and opportunities afforded of bringing under the direct notice of many farmers some of the more important aspects of the work carried on at the several experimental farms.

Thus, Canadian farmers are growing in intelligence and becoming more resourceful and successful in their work, while the stranger coming among us is helped in many directions with information as to the best way of overcoming difficulties and of directing his energies along profitable lines.

THE GROWING OF WINTER WHEAT IN ALBERTA.

The recent remarkable increase in the quantity of winter wheat grown in the province of Alberta is a subject of much interest and is claiming the attention of grain growers and millers in all parts of the western country. In the Annual Report of the Experimental Farms for 1901, when giving an account of a visit paid during August of that year to the district lying between Cardston and Pincher in Southern Alberta, I said, 'Notwithstanding its high elevation of 3,000 to 3,500 feet the climate is such that winter wheat is grown in many localities quite successfully. This now forms an important crop both at Cardston and Pincher, many of the farmers reaping from 30 to 40 bushels per acre. The variety chiefly grown at Cardston is a beardless red-chaff wheat known as Odessa, that most grown at Pincher is a bearded wheat the name of which has been lost.'

At that time no very large area was occupied by this crop, and with many farmers spring wheat was preferred and the cultivation of winter wheat had scarcely passed the experimental stage. Since then the acreage under this crop has much increased, and the growing of winter wheat become much more general, especially in the Lethbridge, Macleod and Pincher districts.

A statement as to the area under winter wheat and the yield of grain per acre appeared for the first time in the Annual Crop Report for the North-west Territories for 1903, in which it was stated that this crop occupied 3,440 acres and had given a total yield of 82,418 bushels. In 1904 the acreage was increased to 8,296 and the total crop to 152,125 bushels. The returns for 1905 are not yet available, but there is no doubt that they will show a much larger proportionate increase. While the total crop of winter wheat in Alberta in 1904 is far exceeded by spring wheat, it must be borne in mind that in some of the districts of Southern Alberta, where only a limited area of land is under cultivation, winter wheat formed that year more than one-third of the entire wheat crop, and there is little doubt that the returns for 1905 will show a much larger proportion of winter wheat.

INTRODUCTION OF SEED OF SUPERIOR QUALITY.

During the past two or three years, a variety of wheat known as Turkey Red has been introduced and is fast coming into general cultivation in Alberta. Much of the seed sown last year was brought from Kansas, where it is commonly grown. It was brought in by the Canadian Pacific Railway and supplied to the farmers at cost. Turkey Red is a wheat of high quality, probably the best in this respect of all the winter wheats. It is a bearded variety with rather a short head, and does not look as if it would be very productive, and in Ontario it has the reputation of being a light yielder. In Alberta this variety stools very freely, often producing from five to seven heads from a single kernel, and its general productiveness has been a matter of surprise to many. Samples we have had, brought from Kansas, have shown the kernel to be small and thin, with a weight per bushel of 60 to 61 lbs., while in samples grown in Alberta, the kernels have been much more plump and brighter in colour, with a weight per bushel of 64 lb. and over. This wheat is a favourite with millers in Kansas, and there is no doubt it will make excellent flour.

A TOUR OF INVESTIGATION.

With the object of inquiring more fully into the agricultural conditions and possibilities of the western part of southern and northern Alberta, having especially in view the production of winter wheat, a visit was paid during the past season to different parts of that province in company with Mr. A. Mackay, Superintendent of the Experimental farm at Indian Head, Sask.

We arrived at Calgary August 27, when we called on Mr. J. S. Dennis, Superintendent of Irrigation for the Canadian Pacific Railway, from whom we obtained much valuable information, especially with regard to the progress of irrigation in Alberta. Through the courtesy of Mr. Dennis we were shown over the irrigation works of the Canadian Pacific Railway, within ten or twelve miles of Calgary, and had the opportunity of seeing the great progress which has been made there. It is expected that when this gigantic undertaking is completed, that the irrigation ditches will distribute water sufficient to irrigate about one million acres of land. It is difficult to realize the wonderful change this will bring about over a large part of the area lying between Calgary and Medicine Hat and when the irrigated land becomes saturated with sufficient water this will no doubt bring about more favourable conditions of moisture for the growing of crops on adjoining lands too high to be reached by the flowing streams.

JOURNEY THROUGH SOUTHERN ALBERTA.

On August 29 we left Calgary and proceeded southward. North of DeWinton a few fields of wheat were seen from the railway and from Okotoks to High river, a large number of fields were in view. High river was our first stopping place, and here we drove about 50 miles over the country and visited several farms.

HIGH RIVER AND VICINITY.

Mr. R. H. Robertson, High River P.O., had 47 acres of Turkey Red wheat which at this date, August 30, was all cut and threshed. The sample was an excellent one, plump and heavy, and the crop was estimated at from 40 to 44 bushels per acre. Mr. Robertson cut his Turkey Red wheat August 15. He also had a fine field of spring wheat, White Fife, which was cut September 1.

The estimates of crops given throughout this narrative are those of the growers, the correctness of which we had no means of accurately testing, but from what we saw of the wheat under different conditions, while still standing, of the appearance and bulk of the grain when threshed, and of the character of the stubble we regarded the estimates given of the crops on the fields we visited as approximately correct.

Mr. Wm. Thompson, High River, P. O., had 27 acres Turkey Red, estimated yield 35 to 40 bushels per acre. Sowed only one bushel of seed per acre, sown August 15, 1904; cut August 20, 1905. He was threshing at the time of our visit and the grain was a fine sample. He also had a large oat crop which he expected would give from 80 to 90 bushels per acre.

Mr. R. D. Brown, High River, P. O., had 60 acres Turkey Red. He sowed 1¼ bushels per acre on August 15, 1904, and it was cut August 15, 1905. Threshing was in progress August 30. Estimated crop, 40 bushels per acre.

Mr. Gilman, Okotoks, P.O., had 20 acres of winter Wheat, Dawson's Golden Chaff mixed with some Tenessee Giant. This was sown July 26, 1904, and harvested August 10, 1905. The grain was not then threshed, but he expected to get 30 bushels per acre.

Mr. A. Clayton, High River, had 30 acres of winter wheat from which he was expecting 35 bushels per acre.

South of High River, especially from Stavely to Claresholm, many good sized fields were seen under crop and considerable quantities of land were ploughed and ready for seeding.

CLARESHOLM TO MACLEOD.

Claresholm was our next stopping place, where we had another long drive of 50 miles or more before reaching Macleod.

Mr. Robert Pearson, Claresholm, had a large field of winter wheat, which promised well. He was cutting this at the time of our visit and expected it to average over 30 bushels per acre.

Mr. George Hartman, near Claresholm, had 200 acres of winter wheat which was all cut and stacked, but none of it had then been threshed.

From Claresholm to Leavings there were many large fields of winter wheat, and still larger areas sown or ready for sowing, and similar conditions prevailed from Leavings to near Macleod. In this district many large fields of winter wheat were seen, mostly in stook.

Mr. Fred. Garrow, of Cutbanks, had 33 acres of winter wheat which were said to have given him 1,350 bushels in all.

Mr. Grady, 18 miles west of Macleod, had 80 acres of winter wheat which was sown in October, 1904; and cut in the middle of August, 1905. This farm is at an elevation of about 4,000 feet above sea level. The crop was excellent and the grain matured well.

Taylor Bros., 7 miles north of Macleod, had a large field of winter wheat which was all cut and in stook by August 15. He started cutting August 4.

Mr. J. McNaught, 12 miles from Macleod, had 250 acres of wheat, some of which was winter, but most of it was spring wheat.

Mr. Miller, of this district had 50 acres of winter wheat estimated to give 30 bushels per acre.

In the Willow Creek district, 10 miles north of Macleod, Thompson Bros. had over 400 acres of spring wheat, Red Fife, which was then being threshed and was expected to give 25 bushels per acre.

Mr. Lee Evans, 3 miles east of Macleod, had 140 acres under winter wheat, mostly Turkey Red, with some Golden Chaff, which was cut during the first week in August, and was expected to give 25 bushels to the acre.

Mr. Peter Rohlig, Macleod, had 6 acres of winter wheat, Turkey Red, said to have yielded him 56 bushels per acre.

Mr. J. Robert, Macleod, is said to have threshed 500 bushels of good winter wheat, from 10 acres.

Mr. Hayter, of this district, had 200 acres of winter wheat, which is said to have given him an average of 33 bushels per acre.

Mr. Peter Roberts, 9 miles south of Macleod, had six acres of Turkey Red, which gave him 300 bushels of fine wheat.

LETHBRIDGE TO CARDSTON.

From Macleod we went to Lethbridge and visited some farms in that neighbourhood.

Richard G. Watkin had 40 acres of spring wheat, Red Fife, which was just about ready for cutting and looked very promising, this would probably give him from 30 to 35 bushels per acre.

Seven miles from Lethbridge Mr. C. Magrath had 100 acres of Turkey Red. This was sown in August, 1904, and at the time of our visit had been threshed and sold. The yield was 17 bushels per acre. A sample of this wheat was procured, it was very fine and plump and weighed 64 pounds per bushel. This field was on high land, and in this locality the weather was unusually dry and the crop had suffered from drought, which had reduced the yield.

Nine miles from Lethbridge, also on high land, was a very large field said to contain two thousand acres, which seemed to be well prepared. This belonged to Silver and Carman, and at that time was nearly all sown, one seeder only was working at one end of the field to finish it. The ploughing in this case was done in the ordinary way.

Nearly adjoining this was another large field said to contain 500 acres also prepared for winter wheat. This had been broken by a steam plough and seemed to be worked up very evenly.

In travelling over the country from Lethbridge to Cardston by rail many fields of winter wheat were seen, but there was not much opportunity of visiting individual farms.

Mr. T. J. Smellie, of Raymond, came from Idaho one and a half years ago. He had this year 1,300 acres of winter wheat, all Turkey Red, which averaged about 15 bushels per acre. He had expected a larger yield but the very dry weather which preceded harvest there had cut the crop short. He expected to finish seeding 1,000 acres during September. Mr. Smellie grows principally winter wheat, and inclines to the opinion that the Odessa is more profitable than the Turkey Red.

Mr. W. L. Thompson had about 1,700 acres in the Spring Coulee district, chiefly Turkey Red, with some Odessa. Mr. Thompson's wheat was cut and threshed and is said to have averaged from 15 to 20 bushels per acre. We were informed that there were in all about 20,000 acres of wheat in this district, chiefly winter sorts. One elevator was built at Spring Coulee, and a second one nearly built which would be ready in time to receive the crop. Seven elevators in all have been built along this line.

ABOUT PINCHER AND COWLEY.

The next part visited was the district about Pincher and Cowley along the line of the Canadian Pacific Railway towards the Crow's Nest Pass.

At Pincher we saw the wheat fields of Mr. Wm. R. Dobbie. He has 1,170 acres of winter wheat, about 550 of Turkey Red, 200 of Odessa, and the remainder mixed bald and bearded wheats. One field of Turkey Red examined we estimated at 30 to 35 bushels per acre. One part of his crop which had been sown late was lighter and would not probably give more than 15 to 20 bushels per acre.

Mr. G. W. Buchanan, of Pincher, had 300 acres of winter wheat, and many other farmers in the district from 50 to 100 acres or more. Most of the land in this part of the country has been fenced in, and nearly all the homesteads have been taken within reasonable distance of railways, and much additional land held for sale has been purchased by incoming settlers. In driving about this neighbourhood, and from Pincher to Cowley, large quantities of winter wheat were seen in stook covering many hundreds of acres, also many fields of recently sown grain.

At Cowley Mr. Bryce Miller had 110 acres Odessa and Turkey Red. His wheat was cut on August 15.

Mr. J. E. Davison had 50 acres of winter wheat near the station, and many other fields large and small could be seen in the distance.

BEST TIME FOR SOWING, &C.

Much difference of opinion was expressed by the farmers we visited as to the best time to sow winter wheat in Southern Alberta, but judging from the results seen it would appear safer as a rule to sow on well prepared land from the last week in August to the middle of September.

We did not hear of any injurious insects affecting the winter wheat crop, but there was a good deal of smut in the grain in some localities. Where this occurs the grain is considerably lessened in value, and as this disease is so easily prevented by treating the seed with copper sulphate, bluestone, (one pound dissolved in three gallons of water and sprinkled on 10 bushels of grain a few hours before sowing) no farmer should neglect to take this precaution.

With regard to the time of ripening, the winter wheat in Southern Alberta matures on an average about ten days earlier than the spring varieties. Most of the wheat thus far referred to was grown on land which five years ago was considered fit only for grazing and with one or two slight exceptions was all grown without irrigation.

VISIT TO NORTHERN ALBERTA.

In pursuance of this investigation we visited also the northern part of the province from Calgary to Edmonton and found more or less winter wheat being grown at many different points, although the total area under this crop in Northern Alberta is as yet relatively small.

In the suburbs of Calgary Mr. Wm. Pearce had a few acres of winter wheat sown this season which had made strong growth and looked promising.

Fields of winter wheat varying in size were seen from the train in many different places. Some were in stook, others but recently sown and well up. Fields of this crop were most numerous from Crossfield to Olds. In a drive taken through the district surrounding Innisfail, considerable quantities of wheat were seen, some of it winter sorts. In a similar drive about Red Deer several fields of winter wheat were noticed.

Mr. Joseph W. Smith, Red Deer, P.O., had 18 acres of winter wheat which gave him 51 bushels per acre. We saw this wheat, which was very good and plump.

Another farmer a short distance from Red Deer sowed three bushels of Turkey Red wheat on a little less than three acres of land and threshed 151 bushels. This was the first experiment with Turkey Red in that locality.

In travelling from Blackfalds to Lacombe, one large field of winter wheat was seen recently sown and well up, and another large field in stook near Lacombe. During a drive in that neighbourhood other fields were seen.

While in Edmonton two days were occupied in driving about the country, but not much winter wheat was seen there. Had time permitted us to visit a larger number of farmers in Northern Alberta we should no doubt have seen many more fields of this grain.

In the annual report of the Department of Agriculture for the North-west Territories for 1904, the total area of winter wheat grown that year in the several districts included in that part of the province we visited is given as follows:—

District No. 12—Edmonton, Strathcona and Wetaskiwin: Winter wheat 47 acres; average crop, 13·23 bushels per acre.

District No. 13—Red Deer, Lacombe and Ponoka: Winter wheat, 344 acres; average crop, 30·24 bushels per acre.

District No. 14—Innisfail, Olds and Didsbury, including the country adjacent to the Calgary and Edmonton railway from Carstairs to Penhold: Winter wheat, 915 acres; average crop, 21·95 bushels per acre.

From these figures it will be seen that winter wheat is being tested over a large area in Northern Alberta, but it does not yet occupy that prominent position as a crop which it does in the southern parts of the province.

The results of the experiments which have been tried seem to show that the climatic conditions prevailing in Northern Alberta are favourable for the growth of winter wheat; and if further experiments confirm the idea now prevailing that there is a gain of ten days in the time of ripening and a heavier average yield, these potent factors may lead to the cultivation of this grain in the north in much larger quantities. Spring wheat is of course grown successfully over the greater part of the settled country, and the acreage under this crop is rapidly increasing.

When considering the advantages attending the growing of winter wheat in Alberta it should be borne in mind that the land cannot be used so advantageously as in the case of spring wheat. Only one crop of winter wheat can be had in two years, unless an early spring crop be grown, such as oats or mixed grain cut green for feed early enough to admit of the land being ploughed in time for the sowing of winter wheat. Spring grain might of course follow winter wheat, to be succeeded by summer fallow, which would give two grain crops in three years.

In carrying out this investigation a large area of country has been covered, involving over 800 miles of railway travel and over 300 miles by vehicle.

EXPERIMENTS IN GROWING FARM CROPS IN THE YUKON.

With the object of gaining some information as to the agricultural possibilities of some parts of the Yukon Territory, a course of experiments was planned in consultation with the Comptroller of the Royal North-west Mounted Police, who has very kindly co-operated with me in this matter. He has given directions for the proper distribution of the material sent, and both the officers and men of the police force deserve many thanks for the kindly interest they have taken in this work.

The packages of grain, grass seeds and potatoes were forwarded from Ottawa on April 18, 1905, but owing to the lack of mail facilities for carrying packages in that distant region during the winter months they did not reach Dawson until early in June which was too late for uniform success in that climate.

A part of the material forwarded for test was left at White Horse in charge of the commanding officer, Sup. A. E. Snyder, who received the samples there about the middle of May.

LIST OF THE SAMPLES FORWARDED.

8—1-lb. bags Brome Grass Seed.

8—1-lb. bags Western Rye Grass.

8—1-lb. bags Timothy.

8—1-lb. bags Hungarian Grass.

8—5-lb. bags wheat (two each Early Riga, Ladoga, Preston and Stanley).

8—4lb. bags oats (four of Improved Ligowo and two each of Welcome and Tartar King).

8—5-lb. bags barley (four of Mensury and two each of Odessa and Champion).

10—3-lb. bags potatoes (five each of Rochester Rose and Vick's Extra Early).

The following explanations and instructions were sent with the samples:—

'In sending the samples above enumerated provision has been made for testing them at eight or ten different points. The Brome and Western Rye grasses are both very hardy perennial sorts. The Timothy is not so hardy but is also a perennial and will be useful for a comparative test. The Hungarian grass is a variety of Millet, it is an annual which matures very early, and it will I hope be found useful as a forage crop.'

'The grasses should be sown as early as practicable. They may be sown broadcast and covered by hand raking or in rows seven or eight inches apart. If convenient it may be well to try both methods. Where weeds are prevalent, the plots can be more easily kept clean where grass seed is sown in rows. Where plots are allowed to become overgrown with weeds the crops are much injured thereby, and the yields are usually small.

'All the varieties of grain sent are early ripening sorts, and, hence, among the most promising for testing in the Yukon country. They should be sown as early as the land is in condition to be worked, and may be sown broadcast or in drills. If sown broadcast the land should be subsequently raked until the seed is well covered; if in rows the seed should be buried to a depth of two inches. Each sample of grain sent is sufficient to sow one-twentieth of an acre, a plot 33 by 66 feet. The quantity of grass seed in each bag will sow a similar sized plot.

'The varieties of potatoes sent are both extra early sorts. They are also productive and of excellent quality. In preparing them for planting they should be cut so as to have from two to three eyes in each piece, or set, and planted in rows 2½ feet apart, and the sets placed about a foot apart in the rows and covered with about four inches of soil.'

Reports of the results obtained from the planting of these samples were received from the Assistant Commissioner at Dawson, T. G. Moore, commanding officer for the Yukon Territory, also from Supt. A. E. Snyder, commander at White Horse, as follows:—

REPORT ON SEEDS SUPPLIED BY THE EXPERIMENTAL FARM, DEPARTMENT OF AGRICULTURE, SOWN IN YUKON TERRITORY DURING SEASON OF 1905.

Tested by.	Name of Seed.	Date of Planting.	Date of Report.	Report of Grower.
Wm. Horkan. .	Mensury barley.....	13-6-1905	18-8-1905	Sown in new ground, well worked, and is doing well, but was planted too late for perfect maturity this season.
"	" " .... (Seed received 1904.)	23-5-1905	18-8-1905	I planted the same seed in the Government House garden and it ripened well and will be ready for harvest in one week more, or about 13 weeks from seed to sickle. Excellent for the Yukon either for hay or grain, but should be planted early.
"	Odessa barley.......	15-6-1905	18-8-1905	Notwithstanding late sowing and continued dry weather in June and July it has grown vigorously but can hardly ripen perfectly this season. If sown in May or early in June I believe this would be a useful and profitable variety for this climate.
"	Timothy grass	12-6-1905	18-8-1905	Sown in Administration lawn separately and mixed—has done remarkably well, was cut four times and is now refreshing to look at. Well adapted for lawn, pasture and meadow in the Yukon.
"	Brome grass........	12-6-1905	18-8-1905	Sown in Government House lawn separately and mixed with other grasses and in all cases has proved a vigorous grower. A good hay and field grass for this climate.
"	Hungarian grass....	12-6-1905	18-8-1905	Sown in Government House grounds, has done well, was cut three times and is now growing vigorously. A useful grass for this climate.
"	Western Rye grass..	12-6-1905	18-8-1905	Sown on Government House lawn in partial shade. Growth vigorous and very satisfactory.
"	" " ..	13-6-1905	18-8-1905	Sown in Administration grounds separately and mixed with other grasses and in each case has done well and is now verdantly and vigorously growing. Well adapted for this climate.
"	Welcome oats.......	15-6-1905	18-8-1905	Good vigorous grower, but sown too late for this season's harvest. It is now doing well and will be an excellent crop for the Yukon if sown early as frost will permit.
"	Impr'd Ligowo oats.	15-6-1905	18-8-1905	Growing well and promising good returns, but too late for this season's harvest. A good hardy oat that should be planted early.
"	Stanley wheat	15-6-1905	18-8-1905	Sown in new ground, well worked. Is growing nicely and looking well, but too late for practical results this year. I have reserved some of the seed for early planting next season.
"	Preston wheat	15-6-1905	18-8-1905	Growing vigorously and full of promise, but too late to mature before frost. I have reserved some of the seed for next season's early sowing.
"	Rochester Rose potatoes.	12-6-1905	18-8-1905	A good strong vigorous grower; stalks stout and well shaped; tubers of good size and maturing well considering the very late sowing. I think it will be an excellent variety for early planting.
"	Vick's Extra Early potatoes.	12-6-1905	18-8-1905	Stalk growth slender and small, tubers equally backward. Not so good, so far, as the Rochester Rose, sown in the same soil and under equal conditions. Seed received too late for satisfactory test.
P. Reitsma.....	Timothy grass.	8-6-1905	9-9-1905	Growth fairly good.
"	Western Rye grass..	8-6-1905	9-9-1905	Growth very poor.

REPORT ON SEEDS SUPPLIED BY THE EXPERIMENTAL FARM, &c.—*Continued.*

Tested by.	Name of Seed.	Date of Planting.	Date of Report.	Report of Grower.
P. Reitsma	Tartar King oats	9–6–1905	9–9–1905	Growth splendid, will, I believe, mature if put in very early in spring.
"	Mensury barley	9–6–1905	9–9–1905	Splendid growth until the heavy rain set in, would undoubtedly mature here if put in about the middle of May.
"	Vick's Extra Early potatoes.	7–6–1905	9–9–1905	Good growth, a heavy yielder. Did not mature on account of heavy frost in August. N.B.—Above named seeds were planted in rich sand and loamy soil, well manured in previous years. By planting a month earlier we can raise fairly good crops around Dawson.
Supt. Cuthbert	Western Rye grass	7–6–1905	5–9–1905	Both seeds were late in sowing, but have shown good growth and are suitable for this country.
"	Brome grass	....	5–9–1905	" " " "
W. H. Dailey	Timothy grass	24–5–1905	13–9–1905	Cut on August 20th; in flower for over two weeks before cutting.
"	Oats	24–5–1905	13–9–1905	Cut grain on August 29th.
"	Wheat	24–5–1905	13–9–1905	Killed by high water.
N. F. Hagel	Vick's Extra Early potatoes.	....	14–8–1905	The plants are at this date looking exceedingly well and have been in bloom for about three weeks. I think they will mature and have no doubt of it had they been planted earlier.
"	Rochester Rose potatoes.	....	14–8–1905	" " " "
W. R. Dubell	....	....	....	As to results obtained from seeds furnished by the police department, I would like to state that after receiving the seeds and thinking over the matter, I came to the conclusion that neither the soil, conditions or season on which the seeds were received were suitable for a proper test of the same. As I am one of the pioneer farmers of the Yukon Territory, I am very much interested in this matter and I thought best to hold the seeds over for another year in order that I may be able to make what I consider a fair test for the same on an average piece of ground and sown at the proper time for seeding. I will hold the seeds over until the coming spring and will be pleased to furnish the department with specimens and details concerning their culture and growth. I would suggest that all experimental seeds be sent to Dawson during the fall or winter months as a short period of even ten days very often determines the success or failure of any crop of cereals or vegetables in this vicinity. From my experience I consider that any seeds planted after the date on which I received these packages for experiment (latter part of May) would be practically thrown away and in order to give them a fair test should be planted almost before the frost has left the ground. I shall be pleased to furnish the department with any information I can give, at all times.
J. P. Whitehouse	Vick's Extra Early potatoes.	4–6–1905	12 8–1905	Good robust growth; at present in blossom.
"	Rochester Rose potatoes.	4–6–1905	12–8–1905	Not quite as good a grower as Vick's but appears to make a better setting of tubers.
"	Early Riga wheat	5–6–1905	12–8–1905	Made fairly good growth considering the time of sowing; well headed out but quite green at present.

REPORT ON SEEDS SUPPLIED BY THE EXPERIMENTAL FARM, &c.—*Concluded.*

Tested by.	Name of Seed.	Date of Planting.	Date of Report.	Report of Grower.
J. P. Whitehouse	Mensury barley....	5-6-1905	12-8-1905	Made a good start, but frost on night of June 12th cut it down. At present just heading out.
" ..	Ligowo oats....	5-6-1905	12-8-1905	Made very good growth ; stooled heavily and headed well ; straw about 3½ feet in length, quite green at this time.
" ..	Timothy grass.....	5-6-1905	12-8-1905	Some of this I seeded with the oats which has made a fairly good catch. The balance did not do so well seeded alone, owing to dry weather, is just showing up well now.
" ..	Hungarian grass....	5-6-1905	12-8-1905	Owing to drought did not start until late. Will not make any growth to speak of.
" ..	Brome and Western Rye grass.	5-6-1905	12-8-1905	The dry weather held these seeds back for a long time. Not a good catch and I don't think they will stand the winter. N.B.—All these seeds could have been planted by May 10th. At that time the soil was in better condition and the weather more favourable. The Timothy I think will stand the winter. Will report on yield of potatoes and on seeds next spring, if required.

Z. G. Wood,
Assistant Commissioner Comd'g R.N.W.M. Police, Yukon Territory.

REPORT FROM WHITE HORSE.

I have the honour to submit the following report, giving results of the seeds, obtained from the Experimental Farm, Ottawa, and planted at several places in this district this spring:—

GRASS.

Brome—This was planted at White Horse and Ten Mile Point. That at Ten Mile Point only attained a growth of three inches, being planted in new ground, and having no rainfall. That at White Horse, where we had more rain turned out better.

Western Rye—This was planted at White Horse, Ten Mile Point and Big Bend, on the Kluahne trail about 80 miles from White Horse. At White Horse and Big Bend, it was a surprise in growth and would yield about three tons, or so, to the acre, while at Ten Mile Point it only attained a growth of three inches.

Hungarian—This was planted at White Horse and was a failure, the season being too dry. Timothy—This was planted by two different parties at White Horse, with one it turned out a failure while with the other, although planted on poorer ground, made a most luxuriant growth and in the opinion of the man who planted it is admirably suited to the conditions existing in this portion of the Yukon Territory.

At Big Bend the timothy was a failure, the man who planted it claiming that it required more water and better preparation of soil than the rye grass.

OATS.

The Improved Ligowo was planted at White Horse and Big Bend, that at White Horse was planted on high and low ground, both ripening and turning out an excellent quality of oats, while that at Big Bend was a failure, the person planting it claiming that the season there was too dry.

Welcome—Some of this seed was planted at Ten Mile Point, put in on new land with no rainfall, it only grew three inches high and was a failure.

WHEAT.

Preston---This was the only variety planted. From one package planted by Mr. J. C. Shermer, Ten Mile Point, he obtained 20 pounds, which grew to a height of 23 inches.

BARLEY.

Champion—This was planted at White Horse and produced an extra good crop, which was of special quality.

Odessa—This seed was planted on very high ground about seven miles from White Horse and grew to a height of thirty inches.

POTATOES.

Rochester Rose—This seed was planted at Ten Mile Point, and 57 pounds raised from a 3-pound package of potatoes. Another 3-pound package of this variety was planted on high land near White Horse, which, however, only produced 12 pounds, but in every other respect were very satisfactory. In the barrack garden at White Horse a 3-pound package of this seed was planted and produced 98½ pounds, nine potatoes weighing 4½ pounds, those potatoes took first prize at the White Horse fair, and it would appear that this variety is particularly suitable for this soil and climate.

Vicks' Extra Early—This variety was planted in White Horse and turned out fairly good.

All the seeds received were distributed amongst ten different parties; seven at White Horse and neighbourhood, one at Ten Mile Point, one at Big Bend on the Kluahne trail, and one at Big Salmon. The party to whom I distributed seeds at Big Salmon, I was unfortunately unable to get any return from, the seeds after being delivered to him having been burnt in the fire which occurred here on the 22nd of May last.

The seeds were distributed between the 12th and 22nd May, and in some instances were not planted until the end of May, which this year was a little late in the season. In conclusion, I might say that of five seasons, this was the most favourable for growing vegetables and grains in this district, and then we did not have any rainfall till the middle of June. It rained two days during June, the 13th and 26th, the total rainfall of the month being ·93 inches.

A. E. SNYDER,
Supt. Commanding 'H' Division.

The success attending these experiments is quite encouraging considering that the seeds arrived so late, and, it was decided to send out another and larger lot of samples similar to those which had done so well in 1905. To save time a part of these

VIEW ON THE GROUNDS OF THE CENTRAL EXPERIMENTAL FARM, OTTAWA.

Photo. by [illegible]

were forwarded from Brandon, Man., and a second lot from Ottawa. All of these were sent to Dawson addressed to Supt. A. R. Cuthbert.

The samples forwarded from Brandon were sent September 23, and consisted of the following:—

100	lbs.	Preston wheat in	5 lb. bags.
100	"	Stanley wheat in	5 "
100	"	Odessa barley in	2½ "
100	"	Rochester Rose potatoes in	2½ "
100	"	Vick's Extra Early potatoes in	2½ "
50	"	Early Rose potatoes in	2½ "
50	"	Vermont Gold Coin potatoes in	2½ "
25	"	Brome grass in	1 "
25	"	Western Rye grass in	1 "

Subsequently, on October 2, the following were forwarded to the same address, from the Central Experimental Farm, Ottawa:—

100	lbs.	Welcome oats in	2½ lb. bags.
200	"	Improved Ligowo oats in	2½ "
100	"	Odessa barley in	2½ "
200	"	Mensury barley in	2½ "
25	"	Timothy seed in	2½ "
25	"	Hungarian grass in	1 "

A letter was received from Supt. Cuthbert, under date of October 12, acknowledging the receipt of all the samples, which he says arrived in good order.

A further consignment was sent later to White Horse. These samples were sent from the Central Experimental Farm, Ottawa, on November 20, and consisted of the following:—

20	lbs.	Preston wheat in	5 lb. bags.
16	"	Improved Ligowo oats in	4 "
16	"	Odessa barley in	4 "
30	"	Rochester Rose potatoes in	3 "
4	"	Brome grass in	1 "
4	"	Western Rye grass in	1 "
4	"	Timothy in	1 "
4	"	Hungarian grass in	1 "

As these samples have already reached their destination there will be ample time and opportunity for distributing them to the best advantage and so as to admit of their being sown in the coming spring at the earliest opportunity.

Recently samples of two varieties of very early ripening wheats have been forwarded to Dawson. These are new sorts recently introduced by the Cerealist of the experimental farms. One named Aurora, got by selection from an early wheat obtained from a high altitude in the Himalaya mountains in India, the other is an improved and early strain of a cross-bred variety known as Bishop. Aurora is the earliest ripening variety we have yet produced, it ripens more than two weeks earlier than the Red Fife. Bishop is also very early, maturing in about ten days less time than Red Fife. Both are wheats of good quality, but their relative productiveness has not yet been fully ascertained. One pound of the Aurora has been sent in half-pound packages, and two pounds of Bishop also in half-pound packages. The results of these tests will be watched with much interest.

THE INSPECTION AND GRADING OF WHEAT IN THE MANITOBA GRAIN INSPECTION DIVISION.

The methods employed in the inspection of wheat and their fairness to the farmer as well as to the miller or export purchaser have of late attracted some attention. Farmers in some instances have been of opinion that they have not received from the millers the full value, especially of their lower grades of wheat.

This subject has been carefully investigated at the Central Experimental Farm by the Cereal and Chemical Divisions, and a bulletin has been published giving the results of this inquiry. Authentic and representative samples of the different grades of wheat have been obtained from Mr. David Horn, chief inspector of the Manitoba Grain Inspection Division. By the use of a small roller mill flour has been produced from these samples, and the flour made into bread and baked. The results of the bakings several times repeated have been carefully compared as to texture, quality, &c., and the information compiled. In the Chemical Division the samples both of whole wheat and flour have been analysed, and the proportions of their several constituents determined. A comparison of the conclusions reached independently by the Cerealist and Chemist show conclusively that considering the difficulties surrounding this subject, the present system of grading, which is faithfully administered and well carried out works on the whole fairly well. This bulletin has been widely distributed and copies may still be had by any one desiring them by applying to the Director of Experimental Farms.

GRADES OF SPRING WHEAT IN THE MANITOBA GRAIN INSPECTION DIVISION.

The Grain Inspection Act provides that the spring wheat grown in Manitoba and the North-west Territories shall be graded as follows:—

Extra Manitoba hard wheat shall weigh not less than 62 pounds per bushel, shall be plump, sound and well cleaned and shall contain not less than eighty-five per cent of hard red Fife wheat.

No. 1 Manitoba hard wheat shall be plump, sound and well cleaned, weighing not less than 60 lbs. to the bushel, and shall be composed of at least seventy-five per cent of hard red Fife wheat.

No. 1 hard white Fife wheat shall be sound and well cleaned, weighing not less than 60 lbs. to the bushel and shall be composed of not less than sixty per cent of hard white Fife wheat, and shall not contain more than twenty-five per cent of soft wheat.

No. 1 Manitoba northern wheat shall be sound and well cleaned, weighing not less than 60 lbs. to the bushel and shall be composed of at least sixty per cent of hard red Fife wheat.

No. 2 Manitoba northern wheat shall be sound and reasonably clean, of good milling qualities and fit for warehousing, weighing not less than 58 pounds to the bushel, and shall be composed of at least forty-five per cent of hard red Fife wheat.

Any wheat not good enough to be graded No. 2 Manitoba northern shall be graded No. 3 Manitoba northern, in the discretion of the inspector.

These grades form the bulk of the wheat marketed every season. In a good year the larger part of the grain will be No. 1 Hard and No. 1 Northern, while in a poor year the proportions of No. 2 and No. 3 Northern will be larger.

Every year a considerable number of cars containing wheat of too low a quality to be graded as No. 3 Northern, find their way into the market, and special standards are prepared for these low class products, such as No. 4 Extra, No. 4, No. 5, Feed and No. 2 Feed. Any good wheat that is damp and which cannot be safely warehoused, is classed as No Grade. All good wheat that contains a large admixture of other kinds of grain is also classed as No Grade. All grain brought to the market in a heating condition or mixed with heated grain, is entered on the inspector's books as condemned.

Portions of the crop of 1904 were damaged by rust. Some of this when threshed was of so little value and weight that it compared only with elevator cleanings; such grain is graded as 'screenings.'

Any wheat that is injured by smut is classed as 'No. 1 rejected.' If very smutty, as 'No. 2 rejected.'

Where wheat contains a large proportion of weed seeds such as wild oats, the seeds of rag-weed, &c., it is classed as 'rejected,' without using any number.

Such low grades of wheat as cannot be used profitably for flour are ground and sold as feed for stock. Wheat rejected on account of smut or weeds is usually sent to Fort William to an elevator provided with special cleaning apparatus, and after it is cleaned and dried it may be given a grade, and can then be marketed in the usual way.

VISIT TO THE INSPECTOR'S OFFICE AND RAILWAY YARDS.

Being desirous of seeing the actual working of the methods adopted for the inspection and grading of wheat, I called on Mr. David Horn, Chief Inspector at Winnipeg, on the morning of September 23, 1905, who showed me much courtesy. I was first taken through his own office where the work of inspection and grading was in progress. Then provided with a note to one of his deputies, I visited the railway yard where some 200 cars of wheat which had just arrived were being inspected and graded.

As the train comes into the yard the conductor goes to the railway office with his bills to report his train. The inspector makes a list of the grain cars on these bills from which he learns where each car is from, where it is going, the name of the shipper and of the party to whom it is consigned. With this information he goes with his men at once to the train. The inspector has usually three men with him.

One man opens the doors of each car and closes them again after the inspection is over. When the doors are opened the other two men enter the car. A car laden with wheat is usually filled to a depth of about 5 feet. This leaves room between the wheat and the roof of the car for these men to work. One man carries with him a cotton sheet about a yard long and three-quarters of a yard wide, which he spreads on top of the wheat. The other carries what is known as a 'stabber,' a cylindrical brass instrument, reminding one of a large syringe. This is about 6 feet long and 2½ inches in diameter and pointed at the lower end. The instrument is hollow and consists of an interior and exterior tube which by a turn of the handle at the end can be made to slide one on the other. Each tube has openings at intervals, about 5 inches long and an inch wide which are alike in each tube. By turning the outer tube these openings are closed. The stabber is then thrust through the grain in a somewhat slanting direction until the pointed end reaches the floor, then, with a turn of the handle the openings in the tube are brought opposite each other, when the grain immediately flows into and fills the instrument. By reversing the handle the holes are closed so that the grain cannot fall out, and when the 'stabber' is brought up it brings with it a complete section of the wheat which that part of the car contains. The grain is let out of the instrument at the top and placed on the sheet in the form of an irregular band from 4 to 6 inches wide, 2½ feet long, and about half an inch deep, showing the character of the wheat from the top to the bottom of the car. This is done from seven to ten or twelve times in different parts of the car, and spread each time on the sheet as described. When the car has been 'stabbed' a sufficient number of times and the grain properly spread on the sheet, the inspector has before him a complete display of the character and quality of the contents of the car from the bottom to the top. He then examines this and writes on a card the number of the car, the date of inspection, and his opinion of the grade. He also puts about two pounds of the mixed grain on the sheet into a cotton bag which closes by a draw-string, the card is placed inside the bag and the bag hung on a point of the car outside, to be taken from thence to the inspector's office.

Occasionally a car is found to be 'plugged,' that is fraudulently loaded by puttin inferior wheat in parts of the car where the shipper imagines it will not be detected Where any indication of this is noticed the car is 'stabbed' in many places, and al parts of it closely examined. If the inspector has reason to believe that plugging wa intended the law requires that the whole car shall be graded at the same value as th poorest grade found in the car. This penalty is a severe one, and hence 'plugging' i not a common practice.

With sufficient and competent help the grading of grain is very rapidly done, an a whole train load of wheat can be examined and graded in the course of an hour o two. The sample bags from the cars are carried to the inspector's office near the railway yard, where they are successively spread out on a large table, carefully examined and their grade finally determined by the deputy inspectors. The grain is then pu back in the bags with the cards, when they are filed away for reference.

A complete report on each car is made, one copy of which is sent to Fort William and another to the office of the chief inspector, Mr. David Horn. Certificates fo each car are also sent to the parties interested. Every day the entire record for al the cars arriving during the previous 24 hours is completed and disposed of. Fron 20 to 30 men are employed at this work during the busy period. The fee fixed by law for the inspection is 40 cents per car; the cars will average about 1,000 bushels each

HOW FARMERS DISPOSE OF THEIR CROPS.

Some farmers sell their grain at the elevators, while others prefer to load and ship their own grain. These latter usually consign their wheat to an independent broker one not connected in any way with elevator or railway companies. He charges one cent per bushel for looking after the business of marketing the wheat, and remitting the money received for it. If the farmer sells to an elevator company, his wheat is then graded by the man in charge, but only temporarily and for the purpose of giving the farmer cash. If the farmer objects to the local grading a sample of the wheat is sent to the chief inspector at Winnipeg, and if he grades it higher than the man at the elevator did, then the elevator company must pay the farmer the difference in marke price between the grades on the day of sale.

HOW THE CROPS OF 1904 AND 1905 HAVE GRADED.

In the following table the first column shows the total returns for the inspectio of the crop of 1904. In the second column the total number of cars of wheat of th crop of 1905, inspected to December 1, 1905:—

Crop of 1904.

	Cars.
No. 1 Hard	176
No. 1 Northern	3,788
No. 2 "	11,585
No. 3 "	9,293
No. 4 Extra	2,214
No. 4	3,036
No. 5	2,247
Feed	1,098
Feed No. 2	233
Rejected (for weed seeds)	603
No. 1 Rejected (for smut)	631
No. 2 " "	591
Screenings	40
Condemned	78
No Grade	2,279

Crop of 1905 Inspected to Dec. 1, 1905.

	Cars.
No. 1 Hard	532
No. 1 Northern	17,833
No. 2 "	6,858
No. 3 "	996
No. 4 Extra	5
No. 4	58
No. 5	1
Feed	None.
Feed No. 2	None.
Rejected (for weed seeds)	1,535
No. 1 Rejected (for smut)	1,227
No. 2 " "	1,234
Screenings	9
Condemned	10
No Grade	155

INCREASE IN PROPORTION OF WEEDY AND SMUTTY WHEAT.

A study of these figures shows that the character of the season is a most important factor in determining the value of the wheat crop. The year 1904 was comparatively unfavourable, while the present year has been favourable. That portion of the crop (probably about two-thirds of the whole) marketed before December 1, 1905, is largely No. 1 Northern. It is also worthy of comment that the number of cars of wheat graded rejected this year on account of weed seeds is more than double that of 1904. The total number classed as 'rejected' for smut has also more than doubled. While the bulk of this wheat classed as rejected is ultimately recovered, the cost and loss of weight entailed by the scouring and cleansing required to bring the sample into a marketable condition are very considerable and materially lessen the returns received by those farmers who send their wheat to market in a condition so dirty and discreditable as to justify the inspectors in marking it 'rejected.' A more vigorous campaign is evidently needed against weeds and smut, to stir up these careless farmers now to a sense of their duty.

HOW THE UNIFORMITY OF THE GRADES IS MAINTAINED.

Objection has sometimes been made to the method of grading wheat on the ground that the grades are lacking in uniformity from year to year. Prior to 1899 the grades were fixed from season to season by a board of experts, on samples of the current year's growth brought from different localities and compared. Under that arrangement it is quite likely that the grades varied more or less from year to year. Under the present system a handful is taken from each carload, graded and thrown into a vessel or bin provided for that grade, and this grain thus mixed is used as a basis for the same grade the following season. Samples are given to the inspectors and others requiring them, and in this way the grades are maintained of a uniform character.

The system of grading as carried on by the Manitoba Grain Inspection Division, under direction of the Chief Inspector, Mr. David Horn, seems to be very thorough and satisfactory and to command the confidence both of the farmers and buyers in a marked degree.

CO-OPERATIVE EXPERIMENTS BY CANADIAN FARMERS.

The assistance rendered to Canadian farmers by the distribution of samples of seed of high quality for the improvement of crops has been continued with gratifying results. Farmers everywhere have gladly undertaken to co-operate with the experimental farms in the endeavour to ascertain the relative merits in earliness, productiveness and quality of the different sorts under trial when grown under the different climatic conditions which prevail in the several provinces of the Dominion.

During the present year 41,548 farmers have joined in these co-operative tests. A large number of reports have been received expressing appreciation of the great value of this work. The samples of wheat and barley sent out have weighed five pounds each, and those of oats four pounds, sufficient in each case to sow one-twentieth of an acre. The samples of Indian corn, pease and potatoes have weighed three pounds each.

The samples sent from the Central Experimental Farm during the distribution period for the past year have been distributed as follows:—

DISTRIBUTION BY PROVINCES.

Name of Grain.	Prince Edward Island.	Nova Scotia.	New Brunswick.	Quebec.	Ontario.	Manitoba.	North-west Territories.	British Columbia.
Oats	836	1,513	1,664	4,735	1,713	551	1,517	86
Barley	114	433	217	1,473	650	176	579	41
Wheat	250	718	836	2,874	757	1,496	2,499	64
Pease	10	102	131	406	102	39	79	7
Indian Corn	26	148	116	511	450	78	117	33
Potatoes	157	859	1,053	2,075	2,356	905	1,958	436
Total	1,393	3,773	4,017	12,074	6,028	3,245	6,749	667

Total number of samples distributed, 37,946.
Number of applicants supplied, 37,865.

Total number of packages of each sort distributed :—

Oats	12,615
Barley	3,683
Wheat	9,494
Pease	876
Indian Corn	1,479
Potatoes	9,799
Total	37,946

The following list shows the number of packages which have been sent of the different varieties :—

Name of Variety.	Number of Packages.
OATS.	
Banner	3,027
Improved Ligowo	1,633
Waverley	1,514
Wide Awake	1,503
Thousand Dollar	1,448
Abundance	1,354
Tartar King	1,088
Goldfinder	749
Black Beauty	299
Total	12,615
BARLEY (Six-rowed).	
Mensury	928
Odessa	611
Claude	605
Mansfield	465
(Two-rowed.)	
Invincible	369
Standwell	282
Sidney	252
Canadian Thorpe	171
Total	3,683

Name of Variety.	Number of Packages.
SPRING WHEAT.	
Laurel	1,950
Preston	1,694
Red Fife	1,262
Stanley	1,029
Wellman's Fife	961
White Fife	836
Percy	804
Huron	591
Monarch	271
White Russian	46
Common Emmer	32
Early Riga	18
Total	9,494
PEASE.	
Arthur	585
White Wonder	291
Total	876

Name of Variety	Number of Packages.
INDIAN CORN.	
Compton's Early	477
Longfellow	376
Early Mastodon	335
Selected Leaming	140
Angel of Midnight	112
Sanford	39
Total	1,479

Name of Variety.	Number of Packages
POTATOES.	
Early White Prize	1,515
Carman No. 1	1,206
Uncle Sam	1,084
American Wonder	1,071
Canadian Beauty	822
Rochester Rose	742
Dr. Maerker	581
Early Andes	499
Burnaby Mammoth	452
Bovee	431
Country Gentleman	420
Money Maker	340
Everett	285
Swiss Snow Flake	196
Late Puritan	139
Dreer's Standard	16
Total	9,799

DISTRIBUTION OF SAMPLES FROM THE BRANCH EXPERIMENTAL FARMS.

Samples were also distributed from the Branch Experimental Farms, as follows:—

Experimental Farm, Nappan, N.S.	No. of Sample Bags.
Spring wheat	69
Oats	167
Barley	89
Pease	41
Potatoes	280
Buckwheat	23
Total	669

Experimental Farm, Brandon, Man.	No. of Sample Bags.
Spring wheat	131
Oats	100
Barley	40
Pease	72
Potatoes	206
Total	549

Experimental Farm, Indian Head, Sask.	
Spring wheat	546
Oats	406
Barley	197
Pease	87
Flax, Rye and Spelt	25
Potatoes	618
Total	1,879

Experimental Farm, Agassiz, B.C.	
Spring wheat	56
Oats	173
Barley	74
Pease	161
Potatoes	203
Total	667

By adding the number of farmers supplied by the Branch Farms to those supplied by the Central Farm we have a total of 41,548. It is gratifying to find among the farmers of Canada so large a number of volunteers in this co-operative work. The average number of samples distributed each year for the past ten years has been 37,521.

In growing and preparing this large quantity of seed grain for distribution great care is taken to have it clean and true to name. Most of it is grown on the Experimental Farms at Indian Head and Brandon, where the crops average larger yields and a heavier weight per bushel than they do at Ottawa.

To provide the large quantity of seed required for this work arrangements are made for growing the varieties needed the previous year. While maturing in the fields most of the grain is carefully examined and any plants found of other varieties are pulled up. After the grain is threshed it is passed through suitable cleaning machinery and then thoroughly examined, and if there are any foreign seeds present which the cleaners will not remove the grain is hand-picked before it is sent out. These samples are sent free of charge to the nearest post office. They are sent only in response to personal application, and only one variety is obtainable by one applicant each year. Those farmers who take good care of the sample received usually have at the end of the second year sufficient seed for a considerable area, and after that have all they require for their own use, and some surplus to sell to their neighbours.

It is remarkable how rapidly a supply of grain may be built up from a single four or five-pound sample. Take for instance, a sample of oats. The four pounds received will, if well cared for, usually produce from three to four bushels. This sown on two acres of land will at a very moderate estimate give one hundred bushels, and some times much more, but taking the lower figure as the basis for this calculation, the crop at the end of the second year would be sufficient to sow fifty acres, which at the same moderate computation would furnish 2,500 bushels, available for seed or sale at the end of the third year.

The critical point in these tests is the threshing of the grain at the end of the first season, and it is here that some farmers fail to get the full advantage of the experiment. The product of the one-twentieth acre plot is sometimes threshed in a large machine, which it is difficult to thoroughly clean, and in this way the grain becomes mixed with other varieties and practically ruined. At the Central Experimental Farm we thresh the produce of many of the small plots of grain by cutting off the heads, placing them in sacks and beating them with a stick, and winnowing until most of the chaff is got rid of, and the grain made clean enough for sowing.

Where the farmer is to use this seed for his own sowing it is not necessary that the sample be entirely free from chaff. It is, however, most essential if he is to get the full benefit of his experiment, that the grain be quite free from all admixture with other sorts. Farmers are expected to harvest the product of their experimental plot separately, and store it away carefully, threshing it by hand either with a flail or in such other manner as they may prefer. The results to be gained will abundantly repay the careful handling of the grain in this way.

Occasional complaints are made that the samples are too small and that not less than two bushels of grain should be sent to each applicant. If such quantities were sent the distribution must necessarily be limited to comparatively few individuals, which would be very unfair. The experimental farm officers have also been criticised for not arranging to sell any surplus seed grain to farmers in quantities of two bushels and upwards. As a matter of fact this has been the practice at the western farms for many years past. Every season after the regular distribution of smaller samples has been provided for the surplus grain not needed for seed has been sold to farmers in quantities of two to ten bushels or more each.

At the Indian Head Experimental Farm the following number of farmers have been supplied in this way:

In 1904—

24	farmers purchased from 2 to 5 bushels each of seed wheat.
7	two to five bushels of seed oats.
9	two to five bushels of seed barley.
40	in all.

In 1905—

107	farmers bought from 2 to 10 bushels each of seed wheat.
74	two to ten bushels or more of seed oats, and
24	bought 2 to 10 bushels or more of seed barley.
205	in all.

At the Brandon experimental farm in 1904—

10	farmers bought from 2 to 10 bushels each of seed wheat.
112	two to ten bushels or more of seed oats, and
21	from 2 to 10 bushels, or more of seed barley.
143	in all.

In 1905—

32	farmers bought from 1 to 5 bushels each of seed wheat.
6	from 2 to ten bushels, or more of seed oats, and
30	from 2 to ten bushels, or more of seed barley.
68	in all.

It will thus be seen that within the past two years 245 farmers have been supplied with these larger lots from the experimental farm at Indian Head and 211 from the experimental farm at Brandon, a total of 456. The following note from one of those who bought seed wheat at Brandon will serve as an example of the way these larger lots are appreciated:—

GLADSTONE, MAN., December 29, 1905.

S. A. BEDFORD, ESQ.,

DEAR SIR,—Just a few lines in report on the four bushels of Red Fife wheat that James Huddleston and myself received from you last spring. We sowed it on April 24 and harvested it on August 26. There was about three acres and the total yield was 133 bushels, about 45 bushels per acre, which was about twice the yield of the rest of our crop. I must say we are well satisfied and would recommend any farmer to get a few bushels of wheat from you when possible.

Yours respectfully,

A. M. HUDDLESTON.

CORRESPONDENCE.

The correspondence carried on during 1905 between the farmers of Canada and the officers of the Experimental Farms has been very large.

CENTRAL EXPERIMENTAL FARM.

The following is a summary of the letters received and sent out at the Central Experimental Farm from December 1, 1904 to November 30, 1905; also the number of reports, bulletins and circulars forwarded by mail during the same period:—

	Letters received.	Letters sent.
Director	51,908	19,074
Agriculturist	2,090	3,206
Horticulturist	1,634	1,626
Chemist	1,531	1,441
Entomologist and Botanist	3,406	3,291
Cerealist	289	208
Poultry Manager	2,993	3,043
Accountant	988	1,401
Totals	64,839	33,290

A large number of the letters received by the Director are applications for samples of grain, or for the publications of the farms, a considerable proportion of which are answered by sending the correspondents the material asked for, accompanied by circular letters. This explains why the number of letters received so much exceeds the number sent out.

Circular letters, including circulars sent with samples of seed grain	39,105
Reports and bulletins mailed	351,374
Total	390,479

BRANCH EXPERIMENTAL FARMS.

The correspondence with the Superintendents of the branch experimental farms is shown by the following figures:—

	Letters received.	Letters sent.
Experimental Farm, Nappan, N.S.	2,080	1,812
" Brandon, Man.	4,783	3,140
" Indian Head, Sask. . . .	7,820	7,874
" Agassiz, B. C.	3,187	2,953
Totals.	17,870	15,779

Much additional information has also been sent out from the branch farms in printed circulars. By adding the correspondance conducted at the branch farms to that of the central farm, it will be seen that 82,709 letters in all were received, and 49,069 sent out during the year..

TESTS OF THE VITALITY OF SEED GRAIN AND OTHER SEEDS.

The number of samples of seeds tested during the season of 1904-05 to find the proportion which would germinate and to determine the percentage of plants of strong and weak growth, was 1,949.

This useful work has been carried on at the Central Experimental Farm every year since its establishment in 1887, and the total number of samples tested from that time to the present is 33,685. By instruction of the Hon. Minister of Agriculture this work will in future be done by the seed division, hence any farmer or seedsman desiring to have samples tested should address them to the Seed Commissioner, Department of Agriculture, Ottawa.

RESULTS OF TESTS OF SEEDS FOR VITALITY 1904-05.

Kind of Seed.	Number of Tests.	Highest Percentage.	Lowest Percentage.	Percentage of Strong Growth.	Percentage of Weak Growth	Average Vitality.
Wheat.	660	100·0	0·0	81·1	4·8	85·9
Barley	328	100·0	3·0	85·5	6·2	91·8
Oats	498	100·0	2·0	78·6	6·3	84·9
Rye.	7	94·0	80·0	81·8	4·1	86·0
Pease.	136	100·0	2·0	. . . .	. . . .	73·4
Grass.	63	98·0	1·0	. . . .	. . . .	74·1
Clover.	112	97·0	26·0	. . . .	. . . .	78·8
Flax	17	78·0	56·0	. . . .	. . . .	67·4
Corn.	34	100·0	26·0	. . . .	. . . .	74·0
Tares.	2	92·0	15·0	. . . .	. . . .	53·5
Carrots	10	88·0	0·0	. . . .	. . . .	30·9
Onions.	8	83·0	2·0	. . . .	. . . .	59·7
Cabbage	9	88·0	1·0	. . . .	. . . .	59·4
Radish.	11	79·0	19·0	. . . .	. . . .	44·6
Squash	7	22·0	0·0	. . . .	. . . .	4·2
Musk melon.	8	72·0	4·0	. . . .	. . . .	37·5
Water melon.	2	56·0	44·0	. . . .	. . . .	50·0
Lettuce	4	86·0	10·0	. . . .	. . . .	31·5
Parsnip	4	70·0	40·0	. . . .	. . . .	60·2
Beet.	4	76·0	32·0	. . . .	. . . .	54·0
Tomato.	3	63·0	4·0	. . . .	. . . .	36·6
Celery	3	39·0	0.0	. . . .	. . . .	13·6
Tobacco	6	54·0	10·0	. . . .	. . . .	34·8
Turnips	2	100·0	86·0	. . . .	. . . .	93·0
Cress	2	87·0	7·0	. . . .	. . . .	47·0
Spinach.	2	12·0	0·0	. . . .	. . . .	6·0
Miscellaneous seed.	7	79·0	0·0	. . . .	. . . .	36·1
Total number of samples tested, highest and lowest percentage.	1,949	100·0	0·0	. . . .	. . . .	. . . .

TABLE SHOWING RESULTS OF GRAIN TESTS FOR EACH PROVINCE.

Kind of Seed.	Number of Tests.	Highest Per-centage.	Lowest Per-centage.	Per-centage of Strong Growth.	Per-centage of Weak Growth.	Average Vitality.
ONTARIO.						
Wheat	228	100·0	0·0	69·5	7·1	76·7
Barley	122	100·0	3·0	79·8	8·8	88·7
Oats	121	100·0	2·0	82·4	8·2	90·6
QUEBEC.						
Wheat	33	99·0	63·0	87·1	3.1	90·3
Barley	15	99·0	33·0	84·4	5·0	89·4
Oats	21	100·0	86·0	91.4	2·9	94·4
MANITOBA.						
Wheat	149	100·0	36·0	87·3	4·2	91·6
Barley	54	100·0	65·0	90·0	4·0	94·0
Oats	114	100·0	16·0	74·5	7·2	81·7
NORTH-WEST TERRITORIES.						
Wheat	118	100·0	39·0	83·8	4·1	87·9
Barley	68	100·0	13·0	86·9	4·1	91·1
Oats	160	99·0	4·0	70.5	6·4	76·9
NOVA SCOTIA.						
Wheat	56	100·0	82·0	90·7	3·0	93·8
Barley	47	100·0	78·0	91·9	6·1	98·0
Oats	47	100·0	20·0	93·4	1·9	95·3
NEW BRUNSWICK.						
Wheat	32	100·0	59·0	92·8	1·7	94·5
Barley	8	100·0	38·0	81·2	6·0	87·2
Oats	14	100·0	76·0	90·5	3·6	94·1
PRINCE EDWARD ISLAND.						
Wheat	15	100·0	74·0	95·2	1·1	96·3
Barley	13	100·0	80·0	93·6	3·2	96·9
Oats	15	100·0	79·0	92·0	3·8	95·9
BRITISH COLUMBIA.						
Wheat	29	100·0	50·0	83·4	2·9	86·4
Barley	1	100·0	100·0	98·0	2·0	100·0
Oats	6	94·0	57·0	73·8	7.8	81·6

Signed, WILLIAM T. ELLIS.

METEOROLOGICAL OBSERVATIONS.

TABLE of Meteorological Observations taken at the Central Experimental Farm, Ottawa, 1905; maximum, minimum, and mean temperature for each month, with date of occurrence, also rainfall, snowfall, and total precipitation.

Month.	Maximum.	Minimum.	Range.	Mean.	Highest.	Date.	Lowest.	Date.	Rainfall.	Snowfall.	Total Precipitation.	Number of days Precipitation.	Heaviest in 24 hours.	Date.
	°	°	°	°	°		°							
January...	16·92	—3·69	20·62	6·62	39·3	1st	—20·0	14th	T	34·00	3·39	15	1·40	7th
February..	18·38	—2·16	20·54	8·11	32·0	10th & 20th	—18·7	16th	......	23·00	2·30	15	0·45	6th
March.....	33·05	11·45	21·59	22·24	50·9	30th	—16·0	14th	0·81	4·00	1·21	10	0·42	19th
April..	52·54	29·74	22·80	41·14	75·0	28th	20·7	2nd	0·89	1·00	0·99	10	0·29	29th
May......	65·82	42·47	23·34	54·14	78·8	25th	29·5	1st & 2nd	1·90	......	1·90	13	0·39	15th
June.......	75·80	52·80	23·00	64·30	86·5	20th	39·0	1st & 8th	4·63	.....	4·63	11	1·94	13th
July.	79·67	58·62	21·04	69·14	91·4	18th	48·0	21st	4·76	.....	4·76	19	1·13	30th
August....	77·02	53·73	23·28	65·37	86·6	10th	45·2	14th	4·07	.....	4·07	15	0·87	12th
September.	69·45	48·00	21·44	58·72	80·2	10th	32·2	26th	2·83	....	2·83	14	0·98	18th
October....	55·65	35·08	20·57	45·36	76·0	1st	16·5	30th	2·43	0·50	2·48	14	0·75	11th
November..	38·17	22·86	15·31	30·51	53·2	25th	3·2	30th	0·56	8·25	1·38	14	0·40	8th
December..	28·60	11·57	17·02	20·08	41·5	8th	—13·1	16th	0·83	16·50	2·48	20	0·78	29th
	.....	.....	...	.. ..	....	....	.....	.. ....	23·71	87·25	32·42	170	....	....

Rain or snow fell on 170 days during the 12 months.

Heaviest rainfall in 24 hours, 1.94 inches on June 13th.

Heaviest snowfall in 24 hours, 14·00 inches on January 7th.

The highest temperature during the 12 months was 91·°4 on July 18th.

The lowest temperature during the 12 months was 20·°0 on January 14th.

During the growing season rain fell on 10 days in April, 13 days in May, 11 days in June, 19 days in July, 15 days in August, and 14 days in September.

March and April show the lowest number of days with precipitation, viz., on 10 days during each month.

Total precipitation during the 12 months, 32·42 inches, as compared with 36·79 inches during 1904.

RAINFALL, Snowfall and Total Precipitation from 1890 to 1905; also the average annual amount that has fallen.

Year.	Rainfall.	Snowfall.	Total Precipitation.
1890	24·73	64·85	31·22
1891	30·19	73·50	37·54
1892	23·78	105·00	34·28
1893	31·79	72·50	39·04
1894	23·05	71·50	30·20
1895	27·01	87·50	35·76
1896	21·53	99·75	31·50
1897	24·18	89·00	33·08
1898	24·75	112·25	35·97
1899	33·86	77·25	41·63
1900	29·48	108·00	40·27
1901	29·21	97·25	38·91
1902	25·94	101·75	36·10
1903	26·43	85·00	34·92
1904	25·95	108·75	36·79
1905	23·71	87·25	32·42
Total for 16 years	425·59	1,441·10	569·63
Yearly average for 16 years	26·56	90·06	35·60

RECORD of Sunshine at the Central Experimental Farm, Ottawa, for the year 1905.

MONTHS.	1905.			
	Number of days with Sunshine.	Number of days without Sunshine.	Total hours Sunshine.	Average Sunshine per day.
January	23	8	79·6	2·56
February	21	7	120·8	4·31
March	29	2	169·1	5·45
April	26	4	175·8	5·86
May	29	2	219·6	7·08
June	28	2	195·2	6·50
July	28	3	205·0	6·61
August	30	1	260·5	8·40
September	27	3	155·9	5·19
October	27	4	153·8	4·96
November	21	9	89·4	2·98
December	20	11	68·8	2·21

(Signed,)

WILLIAM T. ELLIS,
Observer.

SPECIAL EXPERIMENTS WITH FERTILIZERS.

In the Annual Report of the Experimental Farms for 1893, details were given on pages 8 to 24 of the results of a series of tests which had then been carried on for some years with the object of gaining information regarding the effects which follow the application of certain fertilizers and combinations of fertilizers on the more important farm crops.

These experiments have been continued, and a summary of the results obtained has been given each year, taking the average yield of crops from the beginning, adding the results for the current year, and then giving the average yield for the full time. These tests were undertaken on virgin soil, on a piece of land which was cleared for the purpose. For particulars regarding the clearing and preparing of the land for crop in 1887-88 and its subsequent treatment, the reader is referred to the earlier issues of this report.

VALUABLE INFORMATION GAINED.

From this long conducted series of tests some useful information has been gained.

These trials have shown that barn-yard manure can be most economically used in the fresh or unrotted condition; that fresh manure is equal, ton for ton, in crop-producing power to rotted manure, which, other experiments have shown, loses during the process of rotting about 60 per cent of its weight. In view of the vast importance of making the best possible use of barn-yard manure, it is difficult to estimate the value of this one item of information.

When these experiments were planned, the opinion was very generally held that untreated mineral phosphate, if very finely ground, was a valuable fertilizer, which gradually gave up its phosphoric acid for the promotion of plant growth. Ten years' experience has shown that mineral phosphate, untreated, is of no value as a fertilizer.

The use of sulphate of iron, which at the time these tests were begun, was highly recommended, as a means of producing increased crops, has also been proven to be of very little value for this purpose.

Common salt, which has long had a reputation with many farmers for its value as a fertilizer for barley, while others disbelieved in its efficacy, has been shown to be a valuable agent for producing an increased crop of that grain, while it is of much less use when applied to crops of spring wheat or oats. Land plaster or gypsum has also proven to be of some value as a fertilizer for barley, while of very little service for wheat or oats. Some light has also been thrown on the relative usefulness of single and combined fertilizers.

CHANGES MADE IN THE EXPERIMENTS.

After ten years' experience had demonstrated that finely-ground, untreated mineral phosphate was of no value as a fertilizer, its use was discontinued in 1898. Prior to this it had been used in each set of plots in Nos. 4, 5, 6, 7 and 8, in all the different series of plots, excepting roots. In 1898 and 1899, similar weights of the Thomas' phosphate were used in place of the mineral phosphate, excepting in plot 6 in each series. In this plot the Thomas' phosphate was used in 1898 only.

After constant cropping for ten or eleven years, it was found that the soil on those plots to which no barn-yard manure had been applied was much depleted of humus, and hence its power of holding moisture had been lessened, and the conditions for plant growth, apart from the question of plant food, had on this account become less favourable. In 1899 the experiments were modified and an effort made to restore some proportion of the humus and at the same time gain further information as to the value of clover as a collector of plant food. In the spring of that year ten pounds of red clover seed per acre was sown with the grain on all the plots of wheat, barley and oats. The young clover plants made rapid growth, and by the middle of October there was a thick mat of foliage varying in height and density on the different plots, which was ploughed under. No barn-yard manure was applied on plots 1 and 2 in each series since 1898.

In 1900 all the fertilizers on all the plots were discontinued, and since then to 1905 the same crops have been grown on all these plots from year to year without fertilizers, sowing clover with the grain each season. In this way some information has been gained as to the value of clover as a collector of plant food, and also as to the unexhausted values of the different fertilizers which have been used on these plots since the experiments were begun. In 1905 all the fertilizers were again used as at the beginning.

SPECIAL TREATMENT OF PLOTS OF INDIAN CORN AND ROOTS.

As it was not practicable to sow clover with the Indian corn and root crops, the sowing of these latter crops was discontinued in the spring of 1900 and clover sown in their place in the proportion of 12 pounds per acre. The clover on these plots made strong growth, so strong as to necessitate twice cutting during the season, the cut clover being left on the ground in each case to decay and add to the fertility of the soil. The clover was left over for further growth in the spring of 1901, and ploughed under for the roots about May 10, and for corn about the middle of that month. Then roots and Indian corn were again sown. In 1902 crops of Indian corn and roots were grown on these plots, in 1903 the land was again devoted to clover and was in Indian corn and roots again in 1904 and in 1905.

WHEAT PLOTS.

The seed sown on each of these plots from the beginning has been in the proportion of 1½ bushels per acre, excepting in 1894; and the varieties used were as follows:—In 1888 to 1891, White Russian, and in 1892-3, Campbell's White Chaff. In 1894, Rio Grande was used, and from 1895 to 1905, inclusive, Red Fife. In 1905 the Red Fife was sown May 4, and was ripe August 12.

TABLE I.

EXPERIMENTS WITH FERTILIZERS ON PLOTS OF WHEAT.

No. of Plot.	Fertilizers applied each year from 1888 to 1898 or 1899. No fertilizers used from that time to 1905. Clover sown in 1899 and each year since with the grain and ploughed under in the autumn. In 1905 fertilizers again applied as at first, clover discontinued.	Average Yield for Seventeen Years.			18th Season 1905. Variety Red Fife.			Average Yield for Eighteen Years.		
		Yield of Grain. Per acre.		Yield of Straw. Per acre	Yield of Grain. Per acre.		Yield of Straw. Per acre	Yield of Grain. Per acre.		Yield of Straw. Per acre
		Bush.	lbs.	Lbs.	Bush.	lbs.	Lbs.	Bush.	lbs.	Lbs.
1	Barn-yard manure (mixed horse and cow manure) well rotted 12 tons per acre in 1888; 15 tons per acre each year after to 1898 inclusive. No manure used from 1899 to 1905. In 1905 15 tons per acre again used.......................... ...	22	$37\frac{16}{17}$	3947	20	50	3610	22	$31\frac{17}{18}$	3928
2	Barn-yard manure (mixed horse and cow manure) fresh, 12 tons per acre in 1888: 15 tons per acre each year after to 1898 inclusive. No manure used from 1899 to 1905. In 1905 15 tons per acre again used.	22	$50\frac{8}{17}$	3985	21	30	3690	22	46	3969
3	Unmanured from the beginning.....	11	$42\frac{16}{17}$	1937	13	10	1460	11	$47\frac{14}{18}$	1910
4	Mineral phosphate, untreated, finely ground, 500 lbs. per acre, used each year from 1888 to 1897 inclusive. In 1898 and 1899 a similar weight of the Thomas' phosphate was used. No fertilizer used from 1900 to 1905. In 1905 Thomas' phosphate again used as in 1899....	12	$23\frac{14}{17}$	2056	16	40	1680	12	$38\frac{1}{18}$	2035
5	Mineral phosphate, untreated, finely ground, 500 lbs., nitrate of soda, 200 lbs., per acre used each year from 1888 to 1897 inclusive. In 1898 and 1899, 500 lbs. of the Thomas' phosphate was used in place of the mineral phosphate. No fertilizers used from 1900 to 1905. In 1905 fertilizers again used as in 1899....	13	$19\frac{12}{17}$	2680	16	10	2190	13	$29\frac{3}{18}$	2653
6	Barn-yard manure, partly rotted and actively fermenting, six tons per acre; mineral phosphate, untreated, finely ground, 500 lbs. per acre, composted together, intimately mixed and allowed to heat for several days before using, applied each year from 1888 to 1897 inclusive. In 1898, 500 lbs. of Thomas' phosphate was used in place of the mineral phosphate. No fertilizers used from 1899 to 1905. In 1905 fertilizers again used as in 1898......................	19	$28\frac{12}{17}$	3270	17	..	3450	19	$20\frac{8}{18}$	3280
7	Mineral phosphate, untreated, finely ground, 500 lbs.; nitrate of soda, 200 lbs.; wood ashes, unleached, 1,000 lbs. per acre, used each year from 1888 to 1897 inclusive. In 1898 and 1899, 500 lbs. of the Thomas' phosphate was used in place of the mineral phosphate. No fertilizers used from 1900 to 1905. In 1905 fertilizers again used as in 1899..............................	13	$52\frac{7}{17}$	2590	15	50	3160	13	$58\frac{17}{18}$	2622
8	Mineral phosphate, untreated, finely ground, 590 lbs.; wood ashes, unleached, 1,500 lbs. per acre, used each year from 1888 to 1897 inclusive. In 1898 and 1899, 500 lbs. of the Thomas' phosphate was used in place of the mineral phosphate. No fertilizers used from 1900 to 1905. In 1905 fertilizers again used as in 1899.....	11	50	2226	15	30	2330	12	$2\frac{4}{18}$	2232

TABLE I.—EXPERIMENTS WITH FERTILIZERS ON PLOTS OF WHEAT—*Concluded.*

No. of Plot.	Fertilizers applied each year from 1888 to 1898 or 1899. No fertilizers used from that time to 1905. Clover sown in 1899 and each year since with the grain and ploughed under in the autumn. In 1905 fertilizers again applied as in 1898, clover discontinued.	Average Yield for Seventeen Years.			18th Season, 1905. Variety, Red Fife.			Average Yield for Eighteen Years.		
		Yield of Grain.		Yield of Straw.	Yield of Grain.		Yield of Straw.	Yield of Grain.		Yield of Straw.
		Per acre.		Per acre	Per acre.		Per acre	Per acre.		Per acre
		Bush.	lbs.	Lbs.	Bush.	lbs.	Lbs.	Bush.	lbs.	Lbs.
9	Mineral superphosphate, No. 1, 500 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizer used from 1900 to 1905. In 1905 fertilizer again used as in 1899	12	$33\frac{3}{17}$	2002	14	40	2110	12	$40\frac{3}{18}$	2008
10	Mineral superphosphate, No. 1, 350 lbs.; nitrate of soda, 200 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizers used from 1900 to 1905. In 1905 fertilizers again used as in 1899	13	28	2935	15	10	2840	13	$33\frac{12}{18}$	2930
11	Mineral superphosphate, No. 1, 350 lbs.; nitrate of soda, 200 lbs.; wood ashes, unleached, 1,500 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizers used from 1900 to 1905. In 1905 fertilizers again used as in 1899	14	$23\frac{14}{17}$	2863	13	40	2780	14	$21\frac{7}{18}$	2858
12	Unmanured from the beginning	10	$41\frac{3}{17}$	1911	10	40	1240	10	$41\frac{2}{18}$	1874
13	Bone, finely ground, 500 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizer used from 1900 to 1905. In 1905 bone again used as at first	12	$47\frac{14}{17}$	2083	14	10	2490	12	$52\frac{7}{18}$	2106
14	Bone, finely ground, 500 lbs.; wood ashes unleached, 1,500 lbs. per acre; used each year from 1888 to 1899 inclusive. No fertilizers used from 1900 to 1905. In 1905 fertilizers again used as at first	15	$32\frac{6}{17}$	2632	15	40	3100	15	$32\frac{14}{18}$	2658
15	Nitrate of soda, 200 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizer used from 1900 to 1995. In 1905 fertilizer again used as at first	14	$21\frac{3}{17}$	2472	15	10	2570	14	$23\frac{16}{18}$	2477
16	Muriate of potash, 150 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizer used from 1900 to 1905. In 1905 fertilizer again used as at first	15	$39\frac{10}{17}$	2282	13	40	2820	15	$32\frac{17}{18}$	2312
17	Sulphate of ammonia, 300 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizer used from 1900 to 1905. In 1905 fertilizer again used as at first	13	$3\frac{10}{17}$	2475	13	10	2450	13	$4\frac{5}{18}$	2474
18	Sulphate of iron, 60 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizer used from 1900 to 1905. In 1905 fertilizer again used as at first	12	$53\frac{4}{17}$	2020	13		2100	12	$53\frac{11}{18}$	2024
19	Common salt (Sodium chloride), 300 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizer used from 1900 to 1905. In 1905 fertilizer again used as at first	13	$54\frac{1}{17}$	1655	13	30	2030	13	$52\frac{13}{18}$	1676
20	Land plaster or gypsum (Calcium sulphate), 300 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizer used from 1900 to 1905. In 1905 fertilizer again used as at first	12	$53\frac{12}{17}$	1966	13	50	1830	12	$56\frac{15}{18}$	1958
21	Mineral superphosphate, No. 2, 500 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizer used from 1900 to 1905. In 1905 fertilizer again used as at first	13	$13\frac{13}{17}$	1960	14	10	1850	13	$16\frac{16}{18}$	1954

Preston Wheat in Stook, Experimental Farm, Indian Head, Sask. Crop, 469 Bushels from 10 Acres.

Photo by C. E. Saunders

BARLEY PLOTS.

The quantity of seed sown per acre on the barley plots was 2 bushels in 1889 to 1891, 1½ bushels in 1892 and 1893, and 2 bushels from 1894 to 1905 inclusive. Two-rowed barley was used for seed throughout until 1902, when Mensury, a six-rowed sort, was tried. The varieties used were as follows: 1889 to 1891, Saale; 1892, Goldthorpe; 1893, Duck-bill; and in 1894 to 1901, Canadian Thorpe, a selected form of the Duck-bill. Since 1902 Mensury has been sown. In 1905 it was sown May 4, and was harvested on July 30.

TABLE II.

EXPERIMENTS WITH FERTILIZERS ON PLOTS OF BARLEY.

No. of Plot.	Fertilizers applied each year from 1889 to 1898 or 1899. No fertilizers used from that time to 1905. Clover sown in 1899 and each year since with the grain and ploughed under in the autumn. In 1905 fertilizers again applied as in 1898. Clover discontinued.	Average Yield for Sixteen Years.			17th Season, 1905. Variety, Mensury.			Average Yield for Seventeen Years.		
		Yield of Grain. Per acre.		Yield of Straw. Per acre	Yield of Grain. Per acre.		Yield of Straw. Per acre	Yield of Grain. Per acre.		Yield of Straw. Per acre
		Bush.	lbs.	Lbs.	Bush.	lbs	Lbs.	Bush.	lbs.	Lbs.
1	Barn-yard manure, well rotted, 15 tons per acre each year to 1898, inclusive. No manure used from 1899 to 1905. In 1905 15 tons per acre again used.............	35	$45\frac{12}{16}$	3047	56	2	2960	37	$5\frac{15}{17}$	3042
2	Barn-yard manure, fresh, 15 tons per acre each year to 1898, inclusive. No manure used from 1899 to 1905. In 1905 15 tons per acre again used.....................	35	$32\frac{2}{16}$	3198	59	38	3010	37	$4\frac{4}{17}$	3187
3	Unmanured from the beginning.........	14	$35\frac{11}{16}$	1530	22	34	1790	15	$10\frac{3}{17}$	1545
4	Mineral phosphate, untreated, finely ground, 500 lbs. per acre, used each year from 1888 to 1897, inclusive. In 1898 and 1899 a similar weight of the Thomas' phosphate was used. No fertilizer used from 1900 to 1905. In 1905 fertilizer again used as in 1899	16	$2\frac{8}{16}$	1519	31	22	2870	16	46	1598
5	Mineral phosphate, untreated, finely ground 500 lbs., nitrate of soda, 200 lbs. per acre. used each year from 1888 to 1897, inclusive. In 1898 and 1899 500 lbs. of the Thomas' phosphate was used in place of the mineral phosphate. No fertilizers used from 1900 to 1905. In 1905 fertilizers again used as in 1899...................	21	$13\frac{6}{16}$	2193	37	4	3070	22	10	2245
6	Barn-yard manure, partly rotted and actively fermenting, 6 tons per acre: mineral phosphate, untreated, finely ground, 500 lbs. per acre composted together, intimately mixed and allowed to heat for several days before using, applied each year from 1888 to 1897, inclusive. In 1898 500 lbs. of the Thomas' phosphate was used in place of the mineral phosphate. No fertilizers used from 1899 to 1905. In 1905 fertilizers again used as in 1898..................................	29	$3\frac{12}{16}$	2416	54	8	3220	30	$26\frac{10}{17}$	2463
7	Mineral phosphate, untreated, finely ground, 500 lbs. nitrate of soda, 200 lbs. ; wood ashes, unleached, 1,000 lbs. per acre, used each year from 1888 to 1897, inclusive. In 1898 and 1899, 500 lbs. of the Thomas' phosphate was used in place of the mineral phosphate. No fertilizers used from 1900 to 1905. In 1905 fertilizers again used as in 1899........................	26	$39\frac{11}{16}$	2401	47	34	3170	28	$2\frac{1}{17}$	2446

TABLE II.—EXPERIMENTS WITH FERTILIZERS ON PLOTS OF BARLEY—*Concluded.*

No. of Plot.	Fertilizers applied each year from 1889 to 1898 or 1899. No fertilizers used from that time to 1905. Clover sown in 1899 and each year since with the grain and ploughed under in the autumn. In 1905 fertilizers again applied as in 1898 clover discontinued.	Average Yield for Sixteen Years.			17th Season, 1905. Variety, Mensury.			Average Yield for Seventeen Years.		
		Yield of Grain.		Yield of Straw.	Yield of Grain.		Yield of Straw.	Yield of Grain.		Yield of Straw.
		Per acre.		Per acre	Per acre.		Per acre	Per acre.		Per acre
		Bush.	lbs.	Lbs.	Bush.	lbs.	Lbs.	Bush.	lbs.	Lbs.
8	Mineral phosphate, untreated, finely ground, 500 lbs., wood ashes, unleached, 1,500 lbs. per acre, used each year from 1888 to 1897, inclusive. In 1898 and 1899, 500 lbs. of the Thomas' phosphate was used in place of the mineral phosphate. No fertilizers used from 1900 to 1905. In 1905 fertilizers again used as in 1899.............	22	$30\frac{9}{16}$	1850	40	..	2720	23	$31\frac{10}{17}$	1901
9	Mineral superphosphate No. 1, 500 lbs. per acre used each year from 1888 to 1899, inclusive. No fertilizer used 1900 to 1905. In 1905 fertilizer again used as in 1899...	22	$0\frac{9}{16}$	1701	38	26	3040	22	$47\frac{4}{17}$	1780
10	Mineral superphosphate, No. 1, 350 lbs.; nitrate of soda, 200 lbs. per acre, used each year from 1888 to 1899, inclusive. No fertilizers used from 1900 to 1905. In 1905 fertilizers again used as in 1899.....	27	$45\frac{4}{16}$	2322	43	36	3350	28	$41\frac{15}{17}$	2382
11	Mineral superphosphate, No. 1, 350 lbs.; nitrate of soda, 200 lbs.; wood ashes, unleached, 1,500 lbs. per acre, used each year from 1888 to 1899, inclusive. No fertilizers used from 1900 to 1905. In 1905 fertilizers again used as in 1899.........	27	$17\frac{2}{16}$	2462	45	30	3180	28	$20\frac{12}{17}$	2504
12	Unmanured from the beginning...... ...	14	$22\frac{1}{16}$	1240	24	28	1880	15	$2\frac{11}{17}$	1278
13	Bone, finely ground, 500 lbs. per acre, used each year from 1888 to 1899, inclusive. No fertilizer used from 1900 to 1905. In 1905 bone again used as at first........... ..	15	$33\frac{7}{16}$	1430	35	20	1530	16	$41\frac{2}{17}$	1436
14	Bone, finely ground, 500 lbs.; wood ashes, unleached, 1,500 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizers used from 1900 to 1905. In 1905 fertilizers again used as at first..........	24	$12\frac{6}{16}$	2123	45	40	2600	25	$25\frac{5}{17}$	2151
15	Nitrate of soda, 200 lbs. per acre, used each year from 1888 to 1899, inclusive. No fertilizer used from 1900 to 1905. In 1905 fertilizer again used as at first...........	21	$46\frac{11}{16}$	2224	28	6	2000	22	$16\frac{1}{17}$	2211
16	Muriate of potash, 150 lbs. per acre, used each year from 1888 to 1899, inclusive. No fertilizer used from 1900 to 1905. In 1905 fertilizer again used as at first...........	22	$43\frac{11}{16}$	1832	31	2	2090	23	$18\frac{11}{17}$	1847
17	Sulphate of ammonia, 300 lbs. per acre, used each year from 1888 to 1899, inclusive. No fertilizer used from 1900 to 1905. In 1905 fertilizer again used as at first..........	19	$17\frac{13}{16}$	1903	32	44	1930	20	$8\frac{1}{17}$	1905
18	Sulphate of iron, 60 lbs. per acre, used each year from 1888 to 1899, inclusive. No fertilizer used from 1900 to 1905. In 1905 fertilizer again used as at first....... .	18	$47\frac{14}{16}$	1633	34	8	1590	19	$42\frac{12}{17}$	1630
19	Common salt (Sodium chloride) 300 lbs. per acre used each year from 1888 to 1899, inclusive. No fertilizer used from 1900 to 1905. In 1905 fertilizer again used as at first...	27	$7\frac{7}{16}$	1868	43	46	1890	28	$6\frac{15}{17}$	1869
20	Land plaster or gypsum (Calcium sulphate), 300 lbs. per acre, used each year from 1888 to 1899, inclusive. No fertilizer used from 1900 to 1905. In 1905 fertilizer again used as at first.........................	20	$30\frac{10}{16}$	1603	31	2	1780	21	12	1613
21	Mineral superphosphate, No. 2, 500 lbs. per acre, used each year from 1889 to 1899, inclusive. No fertilizer used from 1900 to 1905. In 1905 fertilizer again used as at first.................................	21	$19\frac{8}{16}$	1758	37	14	1970	22	16	1770

OAT PLOTS.

The quantity of seed sown per acre on the oat plots was 2 bushels in 1889 and 1890; 1½ bushels in 1891 to 1893, and 2 bushels from 1894 to 1905, inclusive. The varieties used were as follows: In 1889, Early English; in 1890 to 1893, Prize Cluster; and from 1894 to 1905, inclusive, the Banner. In 1905 Banner was sown May 4 and the plots were harvested August 10.

TABLE III.

EXPERIMENTS WITH FERTILIZERS ON PLOTS OF OATS.

No. of Plot.	Fertilizers applied each year from 1889 to 1898 or 1899. No fertilizers used from that time to 1905. Clover sown in 1899 and each year since with the grain and ploughed under in the autumn. In 1905 fertilizers again applied as in 1898. Clover discontinued.	Average Yield for Sixteen Years. Yield of Grain. Per acre.		Average Yield for Sixteen Years. Yield of Straw. Per acre	17th Season, 1905. Variety, Banner. Yield of Grain. Per acre.		17th Season, 1905. Variety, Banner. Yield of Straw. Per acre	Average Yield for Seventeen Years. Yield of Grain. Per acre.		Average Yield for Seventeen Years. Yield of Straw. Per acre
		Bush.	lbs.	Lbs.	Bush.	lbs.	Lbs.	Bush.	lbs.	Lbs.
1	Barn-yard manure, well rotted, 15 tons per acre each year to 1898, inclusive. No manure used from 1899 to 1905. In 1905 15 tons per acre were again used........	51	$24\frac{7}{16}$	3214	64	4	3470	52	$15\frac{4}{17}$	3229
2	Barn-yard manure, fresh, 15 tons per acre each year to 1898, inclusive. No manure used from 1899 to 1905. In 1905 15 tons per acre were again used.	55	$23\frac{12}{16}$	3352	62	22	3650	56	$3\frac{11}{17}$	3370
3	Unmanured from the beginning..........	34	$28\frac{1}{16}$	1774	43	18	1750	35	$11\frac{8}{17}$	1773
4	Mineral phosphate, untreated, finely ground, 500 lbs. per acre, used each year from 1888 to 1897, inclusive. In 1898 and 1899 a similar weight of the Thomas' phosphate was used. No fertilizer used from 1900 to 1905. In 1905 fertilizer again used as in 1899..........	35	$27\frac{10}{16}$	1892	52	22	2450	36	$27\frac{5}{17}$	1925
5	Mineral phosphate, untreated, finely ground, 500 lbs. nitrate of soda, 200 lbs. per acre, used each year from 1888 to 1897, inclusive. In 1898 and 1899, 500 lbs. of the Thomas' phosphate was used in place of the mineral phosphate. No fertilizers used from 1900 to 1905. In 1905 fertilizers again used as in 1899.....	49	$12\frac{12}{16}$	2648	49	14	3240	49	$12\frac{14}{17}$	2673
6	Barn-yard manure, partly rotted and actively fermenting, 6 tons per acre; mineral phosphate, untreated, finely ground, 500 lbs. per acre, composted together, intimately mixed and allowed to heat for several days before using, applied each year from 1888 to 1897, inclusive. In 1898 500 lbs. of Thomas' phosphate was used in place of the mineral phosphate. No fertilizers used from 1899 to 1905. In 1905 fertilizers again used as in 1898..........	48	$32\frac{6}{16}$	2745	60	20	3640	49	$21\frac{11}{17}$	2798
7	Mineral phosphate, untreated, finely ground, 500 lbs.; nitrate of soda, 200 lbs.; wood ashes, unleached, 1,000 lbs. per acre, used each year from 1888 to 1897, inclusive. In 1898 and 1899, 500 lbs. of the Thomas' phosphate was used in place of the mineral phosphate. No fertilizers used from 1900 to 1905. In 1905 fertilizers again used as in 1899.....................	49	$13\frac{14}{16}$	3121	57	32	3300	49	$30\frac{11}{17}$	3132
8	Mineral phosphate, untreated, finely ground, 500 lbs.; wood ashes, unleached, 1,500 lbs. per acre used each year from 1888 to 1897, inclusive. In 1898 and 1899, 500 lbs. of Thomas' phosphate was used in place of the mineral phosphate. No fertilizers used from 1900 to 1905. In 1905 fertilizers again used as in 1899.	44	$19\frac{15}{16}$	2523	52	22	3560	45	$2\frac{1}{17}$	2584
9	Mineral superphosphate, No. 1, 500 lbs. per acre, used each year from 1888 to 1899, inclusive. No fertilizer used from 1900 to 1905. In 1905 fertilizer again used as in 1899..	38	$31\frac{7}{16}$	1999	50	—	2080	39	$19\frac{10}{17}$	2004

EXPERIMENTS WITH FERTILIZERS ON PLOTS OF OATS—*Concluded.*

No. of Plot.	Fertilizers applied each year, from 1889 to 1898 or 1899. No fertilizers used from that time to 1905. Clover sown in 1899 and each year since with the grain and ploughed under in the autumn. In 1905 fertilizers again applied as in 1898. Clover discontinued.	AVERAGE YIELD FOR SIXTEEN YEARS.		17TH SEASON, 1905. VARIETY, BANNER.		AVERAGE YIEL FOR SEVENTEEN YEAR	
		Yield of Grain.	Yield of Straw.	Yield of Grain.	Yield of Straw.	Yield of Grain.	Yiel of Straw
		Per acre.	Per acre	Per acre.	Per acre	Per acre.	Per ac
		Bush. lbs.	Lbs.	Bush. lbs.	Lbs.	Bush. lbs.	Lbs.
10	Mineral superphosphate, No. 1, 350 lbs.; nitrate of soda, 200 lbs. per acre, used each year from 1888 to 1899, inclusive. No fertilizers used from 1900 to 1905. In 1905 fertilizers again used as in 1899.....	47 $14\frac{8}{16}$	2645	57 22	1650	48 $-\frac{16}{17}$	257
11	Mineral superphosphate, No. 1, 350 lbs.; nitrate of soda, 200 lbs.; wood ashes unleached, 1,500 lbs. per acre, used each year from 1888 to 1899, inclusive. No fertilizers used from 1900 to 1905. In 1905 fertilizers again used as in 1899..........	38 $31\frac{14}{16}$	2441	49 4	2190	39 $18\frac{4}{17}$	242
12	Unmanured from the beginning...........	23 $30\frac{13}{16}$	1433	36 6	1580	24 $21\frac{6}{17}$	144
13	Bone, finely ground, 500 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizer used from 1900 to 1905. In 1905 bone again used as at first..................................	35 $19\frac{11}{16}$	2005	48 28	2170	36 $12\frac{3}{17}$	201
14	Bone, finely ground, 500 lbs.; wood ashes, unleached, 1,500 lbs. per acre, used each year from 1888 to 1899, inclusive. No fertilizers used from 1900 to 1905. In 1905 fertilizers used again as at first.....	41 $3\frac{14}{16}$	2300	53 18	2980	41 $28\frac{12}{17}$	234
15	Nitrate of soda, 200 lbs. per acre, used each year from 1888 to 1899, inclusive. No fertilizer used from 1900 to 1905. In 1905 fertilizer used again as at first......	46 $32\frac{14}{16}$	2729	55 ..	3010	47 $14\frac{16}{17}$	274
16	Muriate of potash, 150 lbs. per acre, used each year from 1888 to 1899, inclusive. No fertilizer used from 1900 to 1905. In 1905 fertilizer again used as at first......	40 $4\frac{11}{16}$	2717	56 26	2620	41 $3\frac{16}{17}$	224
17	Sulphate of ammonia, 300 lbs. per acre, used each year from 1888 to 1899, inclusive. No fertilizer used from 1900 to 1905. In 1905 fertilizer again used as at first	45 $32\frac{1}{16}$	2766	59 4	2520	46 $24\frac{7}{17}$	275
18	Sulphate of iron, 60 lbs. per acre, used each year from 1888 to 1899, inclusive. No fertilizer used from 1900 to 1905. In 1905 fertilizer again used as at first	39 $13\frac{11}{16}$	2025	48 18	2690	39 $31\frac{16}{17}$	206
19	Common salt (Sodium chloride), 300 lbs. per acre, used each year from 1888 to 1899, inclusive. No fertilizer used from 1900 to 1905. In 1905 fertilizer used again as at first..............................	39 $13\frac{11}{16}$	1976	49 24	2510	40 $-\frac{5}{17}$	200
20	Land plaster or gypsum (Calcium sulphate), 300 lbs. per acre, used each year from 1888 to 1899, inclusive. No fertilizer used from 1900 to 1905. In 1905 fertilizer again used as at first...................	35 $23\frac{12}{16}$	2060	51 6	2170	36 $20\frac{2}{17}$	206
21	Mineral superphosphate, No. 2, 500 lbs. per acre, used each year from 1889 to 1899, inclusive. No fertilizer used from 1900 to 1905. In 1905 fertilizer again used as at first..................................	36 $17\frac{9}{16}$	1904	52 22	2040	37 $15\frac{14}{17}$	191

The one-tenth acre plots of wheat, barley and oats had by the end of 1903 become infested with several troublesome perennial weeds, hence it was thought best to sow only one-half of each plot with grain in 1904, devoting the other half to a hoed crop to clean the land. On this account no clover was sown on any of the cereal plots in 1904, and one-half of the wheat plots was sown with mangels, one-half of the barley plots with potatoes, and one-half of the oat plots with carrots, computing the yields of grain from a one-twentieth acre plot in each case.

INDIAN CORN PLOTS.

The experiments with the plots of Indian corn have been conducted with the object of obtaining the largest weight of well matured green fodder for the silo, and to have the corn so far advanced when cut, that the ears shall be as far as is practicable in the late milk or glazed condition. Each plot has been divided from the outset into two equal parts, on one of which—known as No. 1—one of the stronger growing and somewhat later ripening sorts has been tried, and on the other, marked No. 2, one of the earlier maturing varieties. During the first four years one of the Dent varieties was tested under No. 1. On the other half of the plot (No. 2) one of the Flint varieties was grown. For the first four years the No. 1 series was planted in drills 3 feet apart, using about 24 pounds of seed to the acre and thinning the plants, when up, to 6 or 8 inches, and the No. 2 in hills 3 feet apart each way with 4 or 5 kernels in a hill. During the past eight years both sorts have been grown in hills.

In 1900 no crop of Indian corn was grown on these plots, but clover was sown in its place on May 5, in the proportion of 12 pounds per acre. This made a strong growth, was cut twice during the season and left on the ground to decay, so that when ploughed under, the land might get the full benefit of the clover crop. The clover was allowed to remain growing until May 20, 1901. It was then ploughed under about 6 inches deep, and harrowed well before the corn was planted. Clover was sown again in 1903, and ploughed under in May, 1904. The corn was planted in 1905, on May 16, and cut for ensilage September 14.

EXPERIMENTS WITH FERTILIZERS ON PLOTS OF INDIAN CORN, CUT GREEN FOR ENSILAGE.

No. of Plot.	Fertilizers applied each year from 1888 to 1898 or 1899. No fertilizers used from that time to 1905. Clover sown in 1900 in place of the corn and ploughed under in May, 1901, before the corn was planted. In 1903 clover was again sown and ploughed under in May, 1904. In 1905 fertilizers again applied as in 1898, clover discontinued.	Average Yield for Thirteen Years.				16th Season, 1905.				Average Yield for Fourteen Years.			
		½ Plot No. 1—weight of green fodder.		½ Plot No. 2—weight of green fodder.		½ Plot No. 1—Thoroughbred White Flint weight of green fodder.		½ Plot No. 2—Angel of Midnight, weight of green fodder.		½ Plot No. 1—weight of green fodder.		½ Plot No. 2—weight of green fodder.	
		Per acre.		Per acre		Per acre.		Per acre		Per acre.		Per acre	
		Tons.	lbs.	Tons	lbs	Tons.	lbs.	Tons	lbs	Tons.	lbs.	Tons	lbs
1	Barn-yard manure (mixed horse and cow manure (well rotted, 12 tons per acre, each year from 1888 to 1898 inclusive. No manure used from 1899 to 1905. In 1905 manure was again used as at first...	16	804	13	332	18	1160	15	1170	16	1076	13	634
2	Barn-yard manure (mixed horse and cow manure) fresh, 12 tons per acre each year from 1888 to 1898 inclusive. No manure used from 1899 to 1905. In 1905 manure was again used as at first..	16	594	11	1161	18	30	15	760	16	809	11	1636
3	Unmanured from the beginning..........	7	399	5	826	6	140	7	836	7	258	5	1077

EXPERIMENTS WITH FERTILIZERS ON PLOTS OF INDIAN CORN.

No. of Plot.	Fertilizers applied each year, from 1888 to 1898 or 1899. No fertilizers used from that time to 1905. Clover sown in 1900 in place of the corn and ploughed under in May, 1901, before the corn was planted. In 1903 clover was again sown and ploughed under in May, 1904. In 1905 fertilizers again applied as in 1898. Clover discontinued.	Average Yield for Thirteen Years.				16th Season, 1905.				Average Yield for Fourteen Years.			
		½ Plot No. 1—weight of green fodder.		½ Plot No. 2—weight of green fodder.		½ Plot No. 1—Thoroughbred White Flint, weight of green fodder.		½ Plot No. 2—Angel of Midnight, weight of green fodder.		½ Plot No. 1—weight of green fodder.		½ Plot No. 2—weight of green fodder.	
		Per acre.		Per acre		Per acre.		Per acre		Per acre.		Per acre	
		Tons.	lbs.	Tons.	lbs	Tons.	lbs.	Tons.	lbs	Tons.	lbs.	Tons.	lbs
4	Mineral phosphate, untreated, finely ground, 800 lbs. per acre, used each year from 1888 to 1897 inclusive. In 1898 and 1899 a similar weight of the Thomas' phosphate was used. No fertilizer used from 1900 to 1905. In 1905 fertilizer again used as in 1899	8	468	5	924	10	1300	10	1210	8	770	5	1567
5	Mineral phosphate, untreated, finely ground, 800 lbs., nitrate of soda, 200 lbs. per acre, used each year from 1888 to 1897 inclusive. In 1898 and 1899, 800 lbs. of the Thomas' phosphate was used in place of the mineral phosphate. No fertilizers used from 1900 to 1905. In 1905 fertilizers again used as in 1899	11	1311	9	578	14	1870	12	1570	11	1721	9	1014
6	Barn-yard manure, partly rotted and actively fermenting, 6 tons per acre; mineral phosphate, untreated, finely ground, 500 lbs. per acre, composted together, intimately mixed and allowed to heat for several days before using, applied each year from 1888 to 1897 inclusive. In 1898 500 lbs. of Thomas' phosphate was used in place of the mineral phosphate. No fertilizers used from 1899 to 1905. In 1905 fertilizers again used as in 1898	16	473	12	288	15	250	13	420	16	334	12	421
7	Mineral phosphate, untreated, finely ground, 500 lbs.; nitrate of soda, 200 lbs.; wood ashes, unleached, 1,000 lbs. per acre, used each year from 1888 to 1897 inclusive. In 1898 and 1899, 500 lbs. of the Thomas' phosphate was used in place of the mineral phosphate. No fertilizers used from 1900 to 1905. In 1905 fertilizers again used as in 1899	15	449	11	660	14	840	12	1320	15	348	11	826
8	Mineral phosphate, untreated, finely ground, 500 lbs., wood ashes, unleached, 1,500 lbs., per acre, used each year from 1888 to 1897 inclusive. In 1898 and 1899 500 lbs. of the Thomas' phosphate was used in place of the mineral phosphate. No fertilizers used from 1900 to 1905. In 1905 fertilizers again used as in 1899	12	564	9	1292	14	1810	13	240	12	892	9	1726
9	Mineral superphosphate, No. 1, 500 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizer used from 1900 to 1905. In 1905 fertilizer again used as in 1899	11	757	8	1651	13	1410	10	1250	11	1048	8	1876
10	Mineral superphosphate, No. 1, 350 lbs.; nitrate of soda, 200 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizers used from 1900 to 1905. In 1905 fertilizers again used as in 1899	13	1060	10	1234	13	1950	10	1660	13	1116	10	1261
11	Mineral superphosphate, No. 1, 350 lbs.; nitrate of soda, 200 lbs.; wood ashes, unleached, 1,500 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizers used from 1900 to 1905. In 1905 fertilizers again used as in 1899	16	532	12	1007	16	740	13	970	16	545	12	1130

EXPERIMENTS WITH FERTILIZERS ON PLOTS OF INDIAN CORN—*Concluded.*

No. of Plot.	Fertilizers applied each year from 1888 to 1898 or 1899. No fertilizers used from that time to 1905. Clover sown in 1900 in place of the corn and ploughed under in May, 1901, before the corn was planted. In 1903 clover was again sown and ploughed under in May, 1904. In 1905 fertilizers again applied as in 1898. Clover discontinued.	Average Yield for Thirteen Years.				16th Season, 1905.				Average Yield for Fourteen Years.			
		½ plot No. 1—weight of green fodder.		½ Plot No. 2—weight of green fodder.		½ Plot No. 1—Thoroughbred White Flint, weight of green fodder.		½ Plot No. 2—Angel of Midnight, weight of green fodder.		½ Plot No. 1—weight of green fodder.		½ Plot No. 2—weight of green fodder.	
		Per acre.		Per acre		Per acre.		Per acre		Per acre.		Per acre	
		Tons.	lbs.	Tons	lbs	Tons.	lbs.	Tons	lbs	Tons.	lbs.	Tons	lbs
12	Unmanured from the beginning....	11	116	9	342	10	1640	10	320	11	86	9	466
13	Bone, finely ground, 500 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizer used from 1900 to 1905. In 1905 bone again used as at first.........	12	538	9	1206	13	1490	12	860	12	722	9	1559
14	Bone, finely ground, 500 lbs.; wood ashes, unleached, 1,500 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizers used from 1900 to 1905. In 1905 fertilizers again used as at first.........	12	1921	10	210	15	600	13	1200	13	213	10	647
15	Nitrate of soda, 200 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizer used from 1900 to 1905. In 1905 fertilizer again used as at first	12	1099	9	1481	12	710	10	1910	12	1075	9	1633
16	Sulphate of ammonia, 300 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizer used from 1900 to 1905. In 1905 fertilizer again used as at first	13	212	10	254	12	1130	11	1260	13	144	10	442
17	Mineral superphosphate, No. 1, 600 lbs.; muriate of potash 200 lbs.; sulphate of ammonia, 150 lbs. per acre, used each year from 1889 to 1899 inclusive. No fertilizer used from 1900 to 1905. In 1905 fertilizer again used as at first	13	1149	10	306	14	780	12	1640	13	1251	10	639
18	Muriate of potash, 300 lbs. per acre, used each year from 1889 to 1899 inclusive. No fertilizer used from 1900 to 1905. In 1905 fertilizer again used as at first..... .. .	10	255	7	960	14	710	13	770	10	783	7	1698
19	Double sulphate of potash and magnesia, 300 lbs. per acre in 1889 and '90; (muriate of potash 200 lbs., substituted, each year since); dried blood, 300 lbs.; mineral superphosphate, No. 1, 500 lbs. per acre, used each year from 1889 to 1899 inclusive. No fertilizers used from 1900 to 1905. In 1905 fertilizers again used as at first	12	765	9	297	15	1770	13	540	12	1203	9	812
20	Wood ashes, unleached, 1,900 lbs. per acre, used each year from 1889 to 1899 inclusive. No fertilizer used from 1900 to 1905. In 1905 fertilizer again used as at first	11	257	8	1119	15	940	13	1430	11	800	8	1763
21	Bone, finely ground, 500 lbs.; sulphate of ammonia, 200 lbs.; muriate of potash, 200 lbs. per acre, used each year from 1889 to 1899 inclusive. No fertilizers used from 1900 to 1905. In 1905 fertilizers again used as at first........................	12	1387	7	1797	14	610	12	1800	12	1588	8	422

PLOTS OF MANGELS AND TURNIPS.

In conducting these experiments, the roots only have been taken from the land, the tops have always been cut off and left on the ground to be ploughed under, so that the plant food they have taken from the soil may be returned to it. One half of each one-tenth acre plot in the series has been devoted to the growth of mangels, and the other half to turnips, and these crops have been alternated from year to year. The preparation of the land has been the same for both these roots. Until 1900 it was ploughed in the autumn after the crop was gathered, gang-ploughed deeply in the spring after the barn-yard manure had been spread on plots 1, 2 and 6, and after gang-ploughing, the other fertilizers were spread by scattering them evenly over the surface, after which it was all harrowed with the smoothing harrow, then made in ridges 2 feet apart, rolled and sown.

The variety of mangel principally grown was the Mammoth Long Red, and four pounds of seed were sown per acre each year.

The variety of turnip chiefly sown was the Prize Purple Top Swede. The land used for the turnips, which are usually sown later than the mangels, was prepared in the same manner as for the mangels. It was then allowed to stand until the day before sowing, when it was gang-ploughed shallow or cultivated to kill weeds and loosen the soil, ridged, rolled and sown. About 3 pounds of seed were sown per acre.

In 1900 and 1903, no crops of mangels or turnips were grown, but clover was sown in their place in May in the proportion of 12 pounds per acre. This made a strong growth and was cut twice each year during the season, and left on the ground to decay, so that when ploughed under, the land might get the full benefit of the clover crop. The clover was allowed to remain growing until near the middle of May, the second year following, by which time it had made a very heavy growth. It was then ploughed under about 6 inches deep and harrowed well, then made into ridges 2 feet apart. These were rolled with a hand roller, which flattened the ridges considerably and made a firm, even seed bed. The crops of clover and roots were alternated in this way, for the purpose of supplying humus and also of gaining information as to the fertilizing effect of green clover ploughed under on land to be used for growing roots.

In 1905, the mangels were sown on May 6, and pulled on October 17; the turnips were sown May 10, and pulled October 8. The yield per acre has been calculated in each case frm the weight of roots gathered from the whole plot.

EXPERIMENTS WITH FERTILIZERS ON PLOTS OF MANGELS AND TURNIPS.

No. of Plot.	Fertilizers applied each year from 1889 to 1898 or 1899. No fertilizers used from that time to 1905. Clover sown in 1900 in place of the roots and ploughed under in May, 1901, before the roots were sown. In 1903 clover was again sown and ploughed under in May, 1904. In 1905 fertilizers again applied as in 1899, clover discontinued.	Average Yield for Thirteen Years.				16th Season, 1905. Varieties.				Average Yield for Fourteen Years.			
		Mangels, Weight of roots.		Turnips, Weight of roots.		East Half Plot. Turnips Purple Top Swede. Weight of roots.		West Half Plot. Mangels Mammoth Long Red, Weight of roots.		Mangels, Weight of roots.		Turnips, Weight of roots.	
		Per Acre.		Per Acre.		Per Acre.		Per Acre.		Per Acre.		Per Acre.	
		Tons.	lbs.	Tons.	lbs.	Tons.	lbs.	Tons.	lbs.	Tons.	lbs.	Tons.	lbs.
1	Barn-yard manure (mixed horse and cow manure) well rotted, 20 tons per acre each year from 1889 to 1898 inclusive. No manure used from 1899 to 1905. In 1905 manure was again used as at first.........	21	1879	16	475	8	300	25	1060	22	358	15	1397
2	Barn-yard manure (mixed horse and cow manure) fresh, 20 tons per acre each year from 1889 to 1898 inclusive. No manure used from 1899 to 1905. In 1905 manure was again used as at first..................	20	1535	16	570	8	30	27	850	21	423	15	1467
3	Unmanured from the beginning.....	9	58	7	1669	2	1610	8	420	8	1949	7	998
4	Mineral phosphate, untreated, finely ground, 1,000 lbs. per acre, used each year from 1889 to 1897, inclusive. In 1898 and 1899 a similar weight of the Thomas' phosphate was used. No fertilizer used from 1900 to 1905. In 1905 fertilizer again used as in 1899.............	8	1739	8	1307	3	1430	10	490	8	1922	8	649

EXPERIMENTS WITH FERTILIZERS ON PLOTS OF MANGELS AND TURNIPS—*Continued.*

No. of Plot.	Fertilizers applied each year from 1889 to 1898 or 1899. No fertilizers used from that time to 1905. Clover sown in 1900 in place of the roots and ploughed under in May, 1901, before the roots were sown. In 1903 clover was again sown and ploughed under in May, 1904. In 1905 fertilizers again applied as in 1899. Clover discontinued.	Average Yield for Thirteen Years.				16th Season, 1905, Varieties.				Average Yield for Fourteen Years.			
		Mangels, Weight of Roots.		Turnips, Weight of Roots.		East Half Plot. Turnips, Purple Top Swede Weight of Roots.		West half Plot. Mangels, Mammoth Long Red, Weight of Roots.		Mangels, Weight of Roots.		Turnips, Weight of Roots.	
		Per Acre.		Per Acre.		Per Acre.		Per Acre.		Per Acre.		Per Acre.	
		Tons.	lbs.	Tons.	lbs.	Tons.	lbs.	Tons.	lbs.	Tons.	lbs.	Tons.	lbs.
5	Mineral phosphate, untreated, finely ground, 1,000 lbs., nitrate of soda, 250 lbs., wood ashes, unleached, 1,000 lbs. per acre, used each year from 1889 to 1897 inclusive. In 1898 and 1899 500 lbs. of the Thomas' phosphate was used in place of the mineral phosphate. No fertilizers used from 1900 to 1905. In 1905 fertilizers again used as in 1899.	14	963	10	1099	5	1660	20	1880	14	1824	10	470
6	Barn-yard manure, partly rotted and actively fermenting, 6 tons per acre; mineral phosphate, untreated, finely ground, 1,000 lbs. per acre, composted together, intimately mixed and allowed to heat for several days before using, applied each year from 1889 to 1897 inclusive. In 1898 1,000 lbs. of Thomas' phosphate was used in place of the mineral phosphate. No fertilizers used from 1899 to 1905. In 1905 fertilizers again used as in 1898.	17	1318	13	755	6	1820	22	560	17	1934	12	1893
7	Mineral phosphate, untreated, finely ground, 1,000 lbs.; sulphate of potash, 200 lbs. in 1889 and 1890 (substituted by muriate of potash, 250 lbs. in 1891 and subsequent years); nitrate of soda, 200 lbs. per acre, used each year from 1889 to 1897 inclusive. In 1898 and 1899 1,000 lbs. of the Thomas' phosphate was used in place of the mineral phosphate. No fertilizers used from 1900 to 1905. In 1905 fertilizers again used as in 1899.	11	1162	9	1695	6	140	19	1370	12	243	9	1191
8	Mineral superphosphate, No. 1, 500 lbs.; sulphate of potash, 200 lbs. in 1889 and 1890 (substituted by muriate of potash, 250 lbs. in 1891 and subsequent years); nitrate of soda, 200 lbs. per acre, used each year from 1889 to 1899 inclusive. No fertilizers used from 1900 to 1905. In 1905 fertilizers again used as in 1899.	13	1690	11	1990	5	1770	17	1970	14	242	11	1175
9	Mineral superphosphate, No. 1, 500 lbs. per acre, used each year from 1889 to 1899 inclusive. No fertilizer used from 1900 to 1905. In 1905 fertilizer again used as in 1899	9	1444	9	1701	4	1050	16	480	10	313	9	991
10	Nitrate of soda, 300 lbs. per acre, used each year from 1889 to 1899, inclusive. No fertilizer use from 1900 to 1905. In 1905 fertilizer used again as in 1899.	14	294	9	1637	4	460	17	950	14	738	9	892
11	Sulphate of ammonia, 300 lbs. per acre, used each year from 1889 to 1899 inclusive. No fertilizer used from 1900 to 1905. In 1905 fertilizer used again as in 1899.	12	529	11	158	5	160	13	1740	12	743	10	1358

EXPERIMENTS WITH FERTILIZERS ON PLOTS OF MANGELS AND TURNIPS—*Concluded.*

No. of Plot.	Fertilizers applied each year from 1889 to 1898 or 1899. No fertilizers used from that time to 1905. Clover sown in 1900 in place of the roots and ploughed under in May, 1901, before the roots were sown. In 1903 clover was again sown and ploughed under in May, 1904. In 1905 fertilizers again applied as in 1899. Clover discontinued.	Average Yield for Thirteen Years.				16th Season, 1905, Varieties.				Average Yield for Fourteen Years.			
		Mangels, Weight of Roots.		Turnips, Weight of Roots.		East Half Plot. Turnips, Purple Top Swede Weight of Roots.		West Half Plot. Mangels, Mammoth Long Red, Weight of Roots.		Mangels, Weight of Roots.		Turnips, Weight of Roots.	
		Per Acre.		Per Acre.		Per Acre.		Per Acre.		Per Acre.		Per Acre.	
		Tons.	lbs.	Tons.	lbs.	Tons.	lbs.	Tons.	lbs.	Tons.	lbs.	Tons.	lbs.
12	Unmanured from the beginning	7	966	7	1407	2	430	7	250	7	918	7	675
13	Bone, finely ground, 500 lbs.; wood ashes, unleached, 1,000 lbs. per acre, used each year from 1889 to 1899 inclusive. No fertilizers used from 1900 to 1905. In 1905 fertilizers again used as at first.........	12	356	9	628	4	1040	13	1580	12	571	8	1989
14	Wood ashes, unleached, 2,000 lbs. per acre, used each year from 1889 to 1899, inclusive. No fertilizer used from 1900 to 1905. In 1905 fertilizer again used as at first.........	11	266	8	1523	5	840	12	600	11	422	8	107
15	Common salt (Sodium chloride), 400 lbs. per acre, used each year from 1889 to 1899 inclusive. No fertilizer used from 1900 to 1905. In 1905 fertilizer again used as at first	9	1814	8	896	3	1590	13	450	10	256	8	27
16	Mineral superphosphate, No. 1, 500 lbs.; nitrate of soda, 200 lbs. per acre, used each year from 1889 to 1899 inclusive. No fertilizers used from 1900 to 1905. In 1905 fertilizers again used as at first.........	12	1801	11	837	4	540	14	530	12	1983	10	188
17	Mineral superphosphate, No. 1, 350 lbs.; wood ashes, unleached, 1,500 lbs. per acre, used each year from 1889 to 1899 inclusive. No fertilizers used from 1900 to 1905. In 1905 fertilizers again used as at first....	13	735	11	301	3	1570	16	1150	13	1163	10	131
18	Mineral superphosphate, No. 1, 500 lbs., muriate of potash, 200 lbs. per acre, used each year from 1889 to 1899 inclusive. No fertilizers used from 1900 to 1905. In 1905 fertilizers again used as at first.........	12	1762	11	1465	4	140	15	1580	13	150	11	443
19	Double sulphate of potash and magnesia, 300 lbs. per acre in 1889 and 1890 (muriate of potash, 200 lbs., substituted each year since); dried blood, 250 lbs.; mineral superphosphate, No. 1, 500 lbs. per acre, used each year from 1889 to 1899 inclusive. No fertilizers used from 1900 to 1905. In 1905 fertilizers again used as at first	14	458	12	1395	4	960	16	1590	14	800	12	299
20	Wood ashes, unleached, 1,500 lbs.; common salt (sodium chloride), 300 lbs. per acre, used each year from 1889 to 1899 inclusive. No fertilizers used from 1900 to 1905. In 1905 fertilizers again used as at first....	14	1922	11	881	3	810	17	300	15	214	10	1810
21	Mineral superphosphate, No. 2, 500 lbs. per acre, used each year from 1889 to 1899 inclusive. No fertilizer used from 1900 to 1905. In 1905 fertilizer again used as at first	14	1725	11	1544	3	110	16	1500	14	1977	11	382

BULLETINS ISSUED DURING 1905.

Five bulletins have been issued during the year: No. 48 on the 'results obtained in 1904 from trial plots of grain, fodder corn, field roots and potatoes.' This bulletin is the tenth of the series of crop bulletins issued from the Experimental Farm, and was prepared jointly by Dr. C. E. Saunders, Cerealist, and the Director. In this bulletin there are presented the results of a large number of experiments which were conducted at all the Experimental Farms during the season of 1904, with oats, barley, spring wheat, pease, Indian corn, turnips, mangels, carrots, sugar beets and potatoes, in plots of uniform size, and the crops grown under uniform conditions. Both the relative earliness and productiveness of the varieties are recorded. The average results are also given of these tests for the past five years, the varieties being arranged in order of their productiveness, for this period.

No. 49, 'the Potato and its Culture, with tests of Varieties found most useful.' This bulletin has been prepared by the Horticulturist of the Central Experimental Farm, Mr. W. T. Macoun. The potato crop is everywhere one of great importance to the community. In bulletin 49 there is presented in convenient form the results gained through a long course of experiments regarding the productiveness, quality and general usefulness of the best sorts of potatoes which have been under trial at the Experimental Farm during the past eighteen years. The number of named varieties tested during this period is over 800, besides several hundred seedlings. The relative merits of all these different sorts have been compared, especially as to their productiveness, quality and earliness in maturing. The best methods of preparing the land for this crop and of planting and cultivating are fully explained; particulars are also given as to the most successful remedies which have been adopted for the destruction of the injurious insects which attack this plant, and for the diseases which affect the vines and tubers. Select lists are also given of those varieties which have proved most useful and profitable.

No. 50 on 'The Milling and Chemical Value of the Grades of Wheat in the Manitoba Inspection Division, Crop of 1904.' This bulletin consists of two parts. Part I. on the Milling Value of the Grades of Wheat, has been prepared by Dr. C. E. Saunders, Cerealist, and Part II. on A Chemical Study of the Grain and Flour, by Mr. Frank T. Shutt, Chemist of the Dominion Experimental Farms.

The investigations reported on in this bulletin were undertaken in response to a request received from the Manitoba Grain Growers Association, asking that the experimental farm staff should determine as accurately as possible the value of each grade of wheat in the Manitoba Inspection Division, for milling purposes, also from the standpoint of chemical composition.

This subject is one of deep interest to the farmers of the Canadian North-west, and every effort has been made to make the investigation thorough and complete. The uniformity of the results obtained by these independent workers gives evidence of the care and accuracy with which the work has been conducted, and will doubtless inspire confidence in the reliability of the conclusions reached.

No. 51, on 'Bacon and Pigs in Canada, Notes on Breeding, Feeding and Managing Swine, with Reports of some Experiments.' This bulletin was prepared by Mr. J. H. Grisdale, Agriculturist of the Central Experimental Farm, and presents a summary of the experiments which have been conducted in reference to pork production since the beginning of this work at the experimental farm. Much information is also given regarding the selection of the best types of animals for carrying on this work, and of the different methods of management as to housing, pasturing, &c. Many facts are also presented in reference to the care and treatment of swine of different ages, and the most profitable methods of feeding them in the several stages of their growth. The swine industry has developed very rapidly in Canada during the past few years, and the facilities the country affords for the extension of this profitable branch of farming are practically unlimited. The useful information given in bulletin 51 will doubtless prove helpful to a large number of those engaged in this branch of farm work.

No. 52, on 'Insects Injurious to Grain and Fodder Crops, Root Crops and Vegetables,' prepared by Dr. James Fletcher, Entomologist and Botanist of the Dominion Experimental Farms.' The injuries annually caused by insects to farm crops, seriously reduce the profits arising from the labour of the farmer. Much of this loss is preventable, and the object of this bulletin is to supply that practical information which will enable the reader to deal with these several pests in the most effective manner and at the least cost. The concise accounts given of the life history and habits of the injurious species treated of, together with the illustrations, will provide the means whereby they may be readily distinguished. The remedies suggested for the destruction of these pests are, as a rule, of easy application and at the same time are very effective.

ANNUAL VISITS TO THE BRANCH EXPERIMENTAL FARMS.

The usual annual visits of inspection were made.

Agassiz was visited during the latter part of August. The weather was dry prior to and at the time of my visit and all the standing crops were in need of rain. The grain was all harvested and threshing was in progress. All the grain crops excepting wheat had been good, that had been injured by weevil. Hay had given very heavy returns, the field roots and corn were growing rapidly and promised to be well up to the average.

The apple crop was about medium, the yield of pears was light, plums variable, some of the more prolific varieties were fruiting well, while others gave only light returns. In the nut orchard the Japanese walnuts and chestnuts were yielding well, English walnuts and Spanish chestnuts both gave light crops, filberts gave more than an average yield.

Indian Head was twice visited, once on the way out to the coast about the middle of August, and the second time on September 11. The first visit was just before harvest began at the return visit in September. I found the grain practically all cut and no frost had occurred up to that time. The wheat in stook looked very heavy and the oats and barley equally good. Field peas were an excellent crop, and roots were growing rapidly and promised well. Potatoes also were giving excellent returns. This season carrots were sown earlier than usual and they were the best crop ever grown at this farm. Clover and Alfalfa were doing well, and Brome Grass and Western Rye Grass had both given excellent crops of hay; orchard grass and timothy had also done well. Corn was being cut on the day I arrived, September 11, and gave good returns. The next day, September 12, there was a light frost, the thermometer registering 31° F. at Indian Head. Most of the tender plants were cut, but no serious injury was done to any of the crops. Fruit, forest trees and ornamental trees and shrubs had all made excellent growth.

Brandon also was visited twice. At the time of the first visit early in August most of the grain was ripening and several of the earliest sorts of barley had been cut. All varieties of grain promised well, oats were unusually heavy. On my return visit the grain had been harvested and the results had been most gratifying. Oats on the experimental plots had given yields varying with the different varieties from 137 bushels to 93 bushels per acre; the 39 different sorts under test averaged 111 bushels. 23 pounds per acre. Corn had given an excellent crop, and potatoes the largest crops ever grown on the farm. The weather had been very favourable for harvesting, and threshing was proceeding in every direction. Many of the cross-bred apples planted in the experimental orchards, both here and at Indian Head, were fruiting well and were attracting much attention from visiting farmers. Both of these farms were in excellent condition.

NAPPAN, Nova Scotia, was visited early in October. The crops of cereals which were all harvested had given yields well above the average; some of the oats gave from 80 to 90 bushels per acre, spring wheat from 20 to 35 bushels and barley from 35 to 49 bushels. Seeding was late in 1905, owing to a cold and wet spring, but favourable weather later on brought the grain crops on rapidly. Hay has given very good crops, much above the average. Field roots and Indian corn produced returns also above the average. The fruit orchards on this farm are doing well, most of the apples gave heavy crops; the other sorts of large fruits gave light returns; small fruits, however, did well.

ACKNOWLEDGMENTS.

I beg to tender grateful acknowledgments to those who have rendered me special service during the year. To the Department of Agriculture, St. Petersburg, Russia, for samples of early maturing varieties of barley brought from the northern grain growing sections of the Empire. To the United States Department of Agriculture for seed of Alfalfa from different countries for test at the experimental farms. To the Director of the Arnold Arboretum, Jamaica Plains, Mass., for seeds of shrubs and trees, also to the Director of the Royal Gardens, Kew, England, for many sorts of seeds of trees, shrubs and flowers.

I thank the officers of the Central and Branch Experimental Farms, for their earnest co-operation in carrying on the different divisions of the work. My acknowledgments are also due to those members of the staff who have assisted me in those branches of the work of which I have retained personal charge. To the farm foreman, Mr. John Fixter, who has carefully supervised the special tests of fertilizers and recorded the results. To Mr. George Fixter, to whom I am indebted for his watchful care over the distribution of samples of seed grain. To Mr. James Taggart for the care and industry he has displayed as foreman of the ornamental grounds, and to Mr. Wm. Ellis for his careful management of the plants and shrubs in the green houses, and the propagation and raising of plants for outside decoration; also for the useful service he has rendered in testing the vitality of seeds and in the taking of meteorological records.

I take pleasure also in bearing testimony to the faithful services of my secretary, Mr. Malcolm C. O'Hanly. The employees also of all the farms have my thanks for the interest they have taken in their work and the care with which they have discharged their respective duties.

WM. SAUNDERS,
Director of Dominion Experimental Farms.

REPORT OF THE AGRICULTURIST

(J. H. Grisdale, B. Agr.)

Dr. Wm. Saunders,
Director Dominion Experimental Farms,
Ottawa.

Sir,—I have the honour to submit herewith reports upon the horses, cattle, sheep, swine and farming operations under my supervision during the past year.

I have to report a fairly successful year in the different branches of my division and in this connection I wish to acknowledge my indebtedness for assistance and interested co-operation in their various positions of the farm foreman, Mr. John Fixter, of the herdsman, Mr. C. T. Brettell, and of the dairyman, Mr. J. Meilleur.

During the year I have attended a number of meetings in various parts of Canada, and have conducted a number of student-judging contests, in addition to my regular work of supervising and directing the experimental feeding and farming operations at the Central Experimental Farm.

From Decmber 1, 1904, to November 30, 1905, 2,090 letters were received, and 3,206 despatched by the agricultural division.

I have the honour to be, sir,
Your obedient servant,
J. H. GRISDALE,
Agriculturist.

LIVE STOCK.

The live stock now (December 1, 1905) occupying the different stables and pens under my charge include horses, cattle, sheep and swine.

HORSES.

The horses are kept for labour exclusively, although some experimental feeding is usually under way to gain some information as to the most economical methods of feeding draught horses, as well as experiments to determine the comparative values of different foods as forage for the same.

The horses are usually 19 in number, made up of:—

Thirteen heavy draught horses of Clydesdale and Percheron blood.

Five heavy driving horses.

One light driver.

CATTLE.

There are representatives of four breeds of cattle, viz.:—

Shorthorn, Ayrshire, Guernsey and Canadian. There are besides, a number of grade cattle and steers. These cattle are kept for breeding and feeding operations, mostly of an experimental character. Pure bred feeding animals are usually on sale, however, and a considerable number are sold in the course of the year.

PURE BRED BREEDING CATTLE.

The pure bred cattle in the barn at present are as follows:—

19 Shorthorns, including 5 bulls and 14 females.
20 Ayrshire, including 3 bulls and 17 females.
12 Guernseys, including 3 bulls and 9 females.
12 Canadians, including 1 bull and 11 females.

GRADE CATTLE.

At present the grades number 18 head, made up of 3 Shorthorn grades, 5 Ayrshire grades, 6 Guernsey grades, and 4 Canadian grades.

Steers.

Forty-seven steers are under feed at present. They are of different ages and breeding, and the number is made up of:

29 two-year-olds. 8 yearlings. 10 calves.

SHEEP.

Sheep are not kept in large numbers, only 42 being now in the pens. Two breeds are kept, namely: Shropshires and Leicesters.

There are 27 Shropshires, as follows:—2 Shearling rams, 5 ram lambs, 11 aged ewes, 6 shearling ewes and 3 ewe lambs.

There are 15 Leicesters, as follows:—10 ewes, 1 ewe lamb, and 4 ram lambs.

SWINE.

Ninety swine of all classes are now in the pens being fed experimentally or being kept for breeding purposes. The breeds kept are Berkshires, Tamworths and Yorkshires.

The Yorkshires are 39 in number, including: 2 stock boars; 24 breeding sows; 13 feeders.

The Berkshires are 12 in number, including: 1 stock boar. 8 breeding sows. 3 feeders.

The Tamworths are 15 in number, including: 1 stock boar; 8 breeding sows; 4 feeders; 2 young boars.

Crossbreds, 24 feeders.

HORSES.

There are 19 horses in the stables. These horses are expected to do the work in the various departments during the year. The work on the '200-acre farm' is but a part of their duties. They work in addition for the horticultural and cereal departments, as well as upon the lawns and in the Arboretum. In addition a large amount of hauling in connection with the different departments, as well as road making and messenger service, takes up much of their time.

HORSE LABOUR.

During the year from July 1, 1904, to June 30, 1905, the work done by the 19 horses kept in the stables here was equivalent to 5,763·9 days' work, distributed as follows:—Live stock, hauling feed, marketing stock, &c., 159·1 days; farm work (200-acre farm) 723·1 days; draining and care of roads, including removing snow and breaking roads in winter, 286·2 days; manure on 200-acre farm, 252·8 days; cleaning land, gathering stones, &c., 10 days; Arboretum, 130·5 days; horticultural division, 664 days; lawns, &c., 175 days; cereal division, 696·6 days; bulletins and reports to and from farm office, 103·6 days; poultry, 31·8 days; mail, including milk delivery, 176·3 days; omnibus service, including 3 horses for omnibus, 2 horses for general driving and 1 horse for supervision of work, 2,345 days; work about greenhouse, outbuildings, sidewalks, exhibitions, &c., 169·9 days.

In estimating the cost of farming operations further on in this report, $3 per day is charged for team and driver. To feed and care for the horses costs 32⅓ cents per horse per working day, and the driver receives $1.72½ per 10-hour day. It is evident, therefore, that the team and driver cost $2.37⅙ per day, leaving a margin of 62⅚ cents, or 31½ cents, nearly, per horse per day for wear and tear.

FEEDING HEAVY HORSES.

The horses have been fed during the year along the lines indicated by recent experimental feeding as reported upon in 1904. The extensive use of bran in the place of oats has resulted in a very considerable saving in the cost of feeding during the year.

An experiment to gain more information as to the value of bran as a horse feed has been conducted this year and may be reported upon as follows:—

The horses, 10 in number, were divided into 5 groups of 2 each; the roughage ration in each case being mixed hay.

During the second period group 1 received a meal mixture of pure oats; group 2, 1 part bran to 1 part oats; group 3, 2 parts bran to 1 part oats; group 4, 2 parts oats, 1 part bran; group 5, oats 1 part, bran 3 parts. The oats were whole in every case.

The meal was fed in three nearly equal portions morning, noon and night, while only one-fifth of the hay was fed in the morning, as much at noon, and the balance or three-fifths at night.

To illustrate, one of the horses in group 1 received his rations as follows:—

Morning, hay 3 lbs.; meal mixture, 6 lbs.

Noon, hay 3 lbs.; meal mixture, 6 lbs.

Evening, hay 8 lbs.; meal mixture, 5 lbs.

FIRST PERIOD OF 21 DAYS.

BRAN FEEDING EXPERIMENT.

Group.	Average weight Sept. 15.	Meal Ration, kind.	Hay (all fed on timothy).	Amt. Meal Mixture fed in 21 days to 1 horse.	Amt. fed in 21 days. Timothy hay.	Daily Meal Ration.	Daily Hay Ration.	Average weight Oct. 6.	Loss — or Gain +	Value of Food consumed in one day.	Value of Food consumed in 21 days.	Cost of Food for 1 year if such a meal ration were fed.	Cost of food for 1 year if pure oats were fed.	Saving in 1 year by feeding such grain ration rather than pure oats.
				Lbs	Lbs	Lbs	Lbs	Lbs.	Lbs.	Cts.	$ cts.	$ cts.	$ cts.	$ cts.
1	1,542	Oats ....2 Bran 1	Timothy	441	420	21	20	1,530	12—	28	6 09	102 20	109 50	7 30
2	1,606	Bran ....3 Oats 1	"	441	357	21	17	1,556	50—	24	5 04	87 60	105 12	17 42
3	1,535	Oats ....3 Bran 1	"	441	420	21	20	1,556	21+	29·5	6 09½	97 67	109 50	11 83
4	1,602	Oats pure.	"	441	420	21	20	1,587	15—	30	6 30	109 50		
5	1,443	Bran ....1 Oats 1	"	441	336	21	16	1,448	5+	25·5	5 35	93 07	104 02	10 95

SECOND PERIOD OF 21 DAYS.

BRAN FEEDING EXPERIMENT.

Group.	Average weight, Oct. 6.	Meal Ration, kind.	Hay (all fed on timothy.)	Amt. Meal Mixture fed in 21 days to 1 horse.	Amt. fed in 21 days. Timothy hay.	Daily Meal Ration.	Daily Hay Ration.	Average weight on Oct. 27	Loss — or Gain +	Value of Food consumed in one day.	Value of Food consumed in 21 days.	Cost of Food for a year if such a meal ration were fed.	Cost of Food for 1 year if pure oats were fed.	Saving in 1 year by feeding such grain ration rather than pure oats.
				Lbs	Lbs	Lbs	Lbs	Lbs.	Lbs.	Cts.	$ cts.	$ cts.	$ cts.	$ cts.
1	1,530	Pure Oats.	Timothy	441	420	21	20	1,551	21+	30	6 30	109 50	109 50	
2	1,556	Bran ....1 Oats 1	"	441	357	21	17	1,548	8—	25·9	5 44	94 53	104 82	10 29
3	1,556	Bran ....2 Oats 1	"	441	420	21	20	1,556	......	25·8	5 42	94 17	109 50	15 33
4	1,587	Bran ....1 Oats 2	"	441	420	21	20	1,576	10—	27·9	5 86	101 83	109 50	7 67
5	1,448	Bran ....3 Oats 1	"	441	336	21	16	1,471	23+	23·6	4 95	86 14	103 36	17 22

The horses on these different rations were employed at various kinds of farm work. During the first three week's period most of the time was spent hauling corn to the silo (very heavy work) but during the last three weeks' period the work was more general in character, such as ploughing, cultivating, hauling roots, &c.

Group 1.—This group consisted of young horses in fair flesh. They were fed during the first period on hay and a concentrate ration of oats 14 lbs., bran 7 lbs. They may be said to have held their own in the three weeks, since they changed only 12 lbs. in weight, a slight loss. During the second period they received the same hay ration and a concentrate ration of pure oats. They did somewhat better during this time, possibly due to lighter work.

Group 2.—Strong mature horses in their prime, were fed during the first period on hay and a concentrate ration of bran and oats, 3 parts bran and 1 part oats. During the 3 weeks they fell off 50 lbs. each, but when changed to a ration of equal parts bran and oats, and given lighter work, they continued to lose weight, though not so rapidly since they lost only 8 lbs. in the 3 weeks.

Group 3.—Strong young horses 5 and 6 years old in good shape. This group were fed during the first period on a concentrate ration of 3 parts oats and 1 part bran. They made a slight gain, about 1 lb. per day, while on this ration, and when changed to a ration of 2 parts bran and 1 part oats during the second period neither gained nor lost during the 21 days.

Group 4.—Large geldings aged 9 and 10 years. They were fed hay and pure oats during the first period, during which 21 days they lost 15 lbs. per head. The ration was changed to bran 1, oats 2, when they still lost, though not quite so heavily, dropping only 10 lbs. in the 21 days.

Group 5.—Somewhat lighter horses, but in their prime were fed during the first period on hay and a concentrate ration made up of equal parts bran and oats. On this ration they made a gain of 5 lbs. each in the 21 days. They were changed to a ration 3 parts oats and 1 part bran during the second period, on which ration they gained 23 lbs. each in the 21 days.

Taking the different rations in turn and examining them we find that:—

On pure oats there was in 1 group a loss of 15 lbs. per period and a gain of 21 lbs. per period in the other group, a net gain of 6 lbs. in 6 weeks.

On oats 2, bran 1 there was during first period a loss of 12 lbs. per horse and a further loss of 10 lbs. per horse during the second period, a total loss of 22 lbs. per horse in 6 weeks.

On oats 1, bran 1 there was during first period a gain of 5 lbs. per horse and a loss of 8 lbs. during the second period, or a net loss of 3 lbs. per horse in the 6 weeks.

On oats 1, bran 3 there was during the first period a loss of 50 lbs. per horse, but a gain of 23 lbs. during the second period, showing a total loss of 27 lbs. per horse in the 6 weeks.

On oats 1, bran 2 there was no change in 3 weeks.

On oats 3, bran 1 there was a gain of 21 lbs. in 3 weeks.

In conclusion, our experiments during 1905 go to corroborate our findings in 1904, when we concluded that bran might very safely and very profitably constitute a very large percentage of the meal ration of working horses. Probably equal parts bran and oats might be taken as a fair proportion in which to mix the two feeds. Where the mixture is being fed to horses with sound teeth there does not seem to be any particular advantage in grinding the oats.

DAIRY CATTLE.

The herd of dairy cattle during the year 1904 consisted of 35 females all told. They were:—

Ayrshires	8
Guernseys	5
Canadians	5
Shorthorns	6
Shorthorn grades	2
Ayrshire grades	4
Guernsey grades	4
Canadian grades	1

FEEDING THE DAIRY CATTLE.

Winter Feeding.

The roughage ration for the winter months was made up of straw, roots, ensilage and clover hay. The straw was cut, the roots were pulped and a mixture in the proportions of 400 lbs. ensilage, 200 lbs. roots and 30 lbs. cut straw prepared every second day. This mixture being put in a solid pile fermented more or less in a few hours, and the whole mass became quite juicy and apparently very palatable to the cows by the time it was being fed. It was fed at the rate of about 40 lbs. per 1,000 lbs. live weight of cows fed.

The meal mixture this year was made up of bran 50 parts, ground oats 25 parts, oil meal 25 parts. This mixture was fed at the same time as the roughage. Each cow received meal in proportion to the amount of milk she was producing. The amount fed varied from 2 lbs. per day up to 13 lbs. per day. The meal portion was thrown on top of the roughage the cow had just received and the whole mass given a slight stir so as to mix the meal with the roughage, thus ensuring the two being eaten together. After succulent roughage and meal had been consumed clover hay was fed at the rate of about 2 lbs. per cow. The cows were fed in this way at 5.30 in the morning and 4 o'clock in the afternoon.

SUMMER FEEDING.

The cows were pastured as usual during the greater part of the summer months. They occupied one field of the three year rotation marked 'E' on page 82, and referred to there, as being under pasture in 1905. This field was able to carry about forty head of cattle for over two months and over thirty head for the next two months. When the pasture began to get bare it was supplemented by soiling crops cut and fed in the stables. A somewhat heavier grain ration was fed this year than during any previous year save 1904, on account of the greater extent to which soiling was carried on. The meal ration in summer consisted of oats and bran about equal parts. It was fed in amounts varying with the milk yield of the cows being fed, save in the case of heifers with their first calves, which usually received more than their records seemed to call for as it was desired to encourage and to cultivate in them the habit of maintaining a heavy and uniform flow of milk during the whole lactation period.

COST OF FEEDING.

In estimating the cost of feeding, the following prices were charged for feed stuffs, being the average local market rates for the same during the season of 1905 save in the case of ensilage and roots, which are charged for at the rate usually affixed in experimental feeding in all parts of America.

Pasture (per month)	$ 1 00	per cow.
Bran	16 00	per ton.
Gluten meal and oil meal	25 00	"
Oats and barley	21 00	"
Clover hay	7 00	"
Chaff	4 00	"
Roots and ensilage	2 00	"

In estimating the value of the product, 20 cents per pound is allowed for the butter and 15 cents per hundred pounds for skim milk and butter milk. The butter is manufactured on the farm and sells on the market at from 22 to 30 cents per pound, an average of about 25 cents per pound during the last year. This leaves about 5 cents per pound for cost of manufacture.

The following tables give in detail the particulars concerning each cow, herd statements for each of the pure bred herds, and monthly statements for all the herds combined.

The monthly statements for the whole milking herd show the total yield of milk for each month, its butterfat content, the amount of butter produced, the number of pounds of milk required for a pound of butter, and the average yield of milk per cow per diem. The highest average per cent fat was recorded in November and the lowest in February.

DAIRY CATTLE REPORTS.

During the year 35 different cows were milked for shorter or longer periods, as indicated on the first page of my report on dairy cattle, whereas in the subjoined 'herd reports' only 3 animals are reported upon in each breed.

In almost any dairy herd of any size some cows will be found that for some reason have given milk during only a small part of any given year. Where a large number of cows are being considered, one or two such cases introduced in estimating the average does not materially affect the same, but where the herds to be compared are small the consideration of one or two such cases in one herd and no such cases in another makes an unjust difference in favour of the latter herd. To overcome this difficulty as far as possible, the records of three of the best cows in each herd, and of cows that had been in milk for the greater part of the year, have been taken and the average estimated from these records, rather than from the records of all cows of that particular breed that happened to calve during the year.

Report 1 is a summary of the more important points in connection with the year's work with the dairy herd.

Report 2 contains the individual records of all cows that gave milk during the year.

Report 3, 4, 5, 6, 7, 8, and 9 give the herd records of the several pure bred and grade herds under test.

REPORT I.

GENERAL SUMMARY.

—	July.	August.	September.	October.	November.	December.	January.	February.	March.	April.	May.	June.	Average.
No. of cows giving milk for month.	25	24	23	27	24	26	20	19	23	26	29	27	24·7
Lbs. of milk in month..	20,481	17,226	15,714	16,605	13,193	14,333	13,060	11,705	18,791	21,813	23,850	22,166	17·411
Average for 1 day.....	660·6	555·6	523·8	535·6	439·7	462·3	421·2	418·8	606·1	727·1	769·3	738·8	571·5
Daily average per cow.......	26·42	23·12	22·77	19·83	18·32	17·78	21·06	22·04	26·34	27·96	26·52	27·36	23·29
Per cent fat........	4·11	4·34	4·08	4·39	4·49	4·04	3·99	3·64	4·02	4·01	3·82	3·96	4·07
Lbs. butter fat..	842·37	749·18	642·12	730·47	592·70	579·10	522·35	426·68	756·01	874.81	910·49	879·45	708·81
Lbs. butter.	991·02	881·38	755·43	859·29	697·29	681·29	610·45	501·97	889·42	1029·30	1071·05	1034·65	833·50
Lbs milk for 1 lb. butter.....	20·66	19·54	20·80	19·32	18·92	21·03	21·41	23·11	21·12	21·19	22·26	21·43	21·73

REPORT 2.

Name of Cows.	Age.	Date of dropping last calf.	Number of days in milk.	Daily average yield of milk.	Total milk for year.	Per cent of fat in milk.	Pounds butter produced in year.	Value of butter at 20 cts. per lb.	Value of skim milk at 15 cts. per 100 lbs.	Total value of product.	Amount meal eaten, valued at 1c. per lb.	Amount of roots and ensilage eaten, valued at $2 per ton.	Amount hay, valued at $7 per ton.	Months on pasture at $1 per month.	Total cost of feed for year.	Cost to produce 100 lbs. milk.	Cost to produce 1 lb. butter, skim-milk neglected.	Profit on 1 lb. butter, skim-milk neglected.	Profit on cow during year, labour neglected.
			Days.	Lbs.	Lbs.	p. c.	Lbs.	$ cts.	$ cts.	$ cts.	Lbs.	Lbs.	Lbs.	Mos	$ cts.	Cts.	Cts.	Cts.	$ cts.
Queeni ....(G.G.)	7	Apr. 5, '05	308	20·1	6,204	6·08	444·	88 80	8 64	97 44	1,767	12,570	1,089	4	38 05	61·3	8·5	11·5	59 39
Itchen Lady ....(G.)	8	" 29, '05	281	29·2	8,211	4·34	420·	84 00	11 68	95 68	1,920	13,480	1,089	4	40 49	49·3	9·6	10·4	55 19
Belle Flower.....(G.G.)	7	Mar. 11, '05	309	27·9	8,621	4·14	425·17	85 03	12 29	97 32	2,127	13,500	1,098	4	42 60	51·6	10·01	9·99	54 72
Fortune............(C.)	9	Dec. 26, '04	283	28·9	8,179	4·23	407·25	81 45	11 65	93 10	2,017	13,430	1,089	4	41 41	50·6	10·1	9·9	51 69
Denty..............(A.)	6	Mar. 2, '05	301	28·2	8,509	4·05	405.67	81 12	12 17	93 29	2,242	13,790	1,089	4	44 02	51·07	10·8	9·2	51 69
Deanie.............(G.)	8	Nov. 30, '04	315	24·3	7,679	4·33	391·92	78 38	10 93	89 31	2,030	13,170	1.089	4	41 28	53·7	10·5	9·5	49 27
Maggie ....(A.)	9	Feb. 21, '05	286	32·	9,152	3·66	395·	79 00	13 13	92 13	2,257	13,780	1,089	4	44 16	48·2	11·1	8·9	48 03
Zamora.......... (C.)	9	July 2, '05	297	24·2	7,217	4·76	404·78	80 95	10 21	91 16	2,319	12,800	1,008	4	43 51	60·2	10·7	9·3	47 97
Jessica..............(A.)	11	Feb. 23, '05	273	33·2	9,165	3·54	382·16	76 43	13 07	89 50	2,257	13,790	1,135	4	44 33	48·3	11·5	8·5	47 65
Alma...........(G.G.)	4	" 5, '05	305	22·8	6,960	4·73	380·	76 00	9 87	85 47	2,050	12,870	1,089	4	41 18	59·1	10·8	9·2	45 17
Flossy Lyons.......(G.)	5	" 14, '05	293	21·003	6,154	5·18	375·20	75 04	8 66	84 70	1,895	12,570	1,089	4	39 33	63·8	10·4	9·6	44 69
Polly...........(G.C.)	10	Mar. 8, '05	284	26·9	7,651	4·08	367·88	73 57	10 92	84 49	2,125	13,170	1,089	4	42 33	55·1	11·4	8·6	44 37
Beauty..........(G.G.)	4	Aug. 15, '04	293	22·9	6,715	3·62	290·02	58 00	9 63	67 63	1,634	9,340	1,089	4	33 49	49·8	11·5	8·5	42 26
Cherry...........(G.S.)	5	Sept. 14, '04	252	26·8	6,767	3·98	317·22	63 44	9 50	72 94	1,859	13,550	1,889	4	39 96	59·5	12·5	7·5	34 14
Bloomer .... (A.)	6	Mar. 18, '05	266	27·	7,199	3·77	319·63	63 92	10 32	74 24	1,997	13,790	1,089	4	41 57	57·7	13·0	7·	32 98
Countess.........(G.A.)	7	June 18, '05	261	26·5	6,929	3·92	319·74	63 94	9 91	73 85	2,040	13,790	1,089	4	42 00	60.6	13·1	6·9	32 67
Marchioness. ....(S.)	11	Mar. 4, '05	302	23·7	7,177	3·68	311·27	62 25	10 40	72 65	2,344	14,290	1,134	4	45 70	63·6	14·6	5·4	31 85
Alice. ....(G.A.)	4	" 28, '05	307	21·9	6,727	3:35	265·58	53 11	9 69	62 80	1,859	13,170	1,089	4	36 57	54·3	13·2	6·8	26 95
Rosy..............(G.S.)	6	Jan. 9, '05	300	22·2	6,679	3·54	278·76	55 75	9 60	65 35	1,817	13,170	1,089	4	39 15	58 6	13·1	6·9	26 23
Exilée..............(C.)	10	....	103	37·01	3,815	4·82	183·17	36 63	5 44	42 07	829	3,980	......	4	16 27	45·	8·8	11·2	26 20
Margerie...........(A.)	3	Sept. 28, '04	253	21·9	5,562	3·98	261·04	52 20	7 95	60 15	1,822	9,650	1,089	4	35 68	64·1	13·6	6·4	25 80
Laura. ....(G.A.)	9	Apr. 6, '05	215	29·2	6,373	3·27	245·21	49 04	9 19	58 23	1,432	13,170	1,089	4	35 30	55·3	14·3	5·7	24 47
Gurta.............(A.)	4	Oct. 31, '04	307	21·3	6,558	3·48	271·54	54 30	9 38	63 68	1,942	13,580	1,089	4	40 81	62·2	15·02	4·98	22 93
Flavia..............(A.)	3	Sept. 23, '04	253	22·5	5,713	3·69	248·78	49 75	8 79	58 54	1,819	10,690	1,089	4	36 69	64·2	14·7	5·3	22 87
Legacy.............(A.)	3	Oct. 7, '04	242	23·3	5,641	3·61	239·83	47 96	8 10	56 06	1,724	10,690	1,089	4	35 74	63 3	14·9	5·1	21 85
Cora..............(A.G.)	3	Jan. 30, '05	125	25·9	3,239	4·01	152·82	31 56	4 63	36 19	814	4,290	397	4	17 82	55·01	11·6	8·4	20 32
Darlington..........(S.)	3	Oct. 21, '04	222	21·9	4,862	3·71	212·47	42 49	6 97	49 46	1,696	9,640	1,089	4	34 41	70·7	16·1	3·9	18 37
Ruby...............(G.)	8	Sept. 28, '04	296	14·8	4,394	4·54	236·23	47 24	6 23	53 47	2,035	13,180	1,089	4	41 34	94·08	17·5	2·5	15 05
Jessica ....(S.)	4	Feb. 9, '05	252	16·2	4,112	4·05	196·09	39 21	5 54	44 75	1,615	13,170	1,089	4	37 13	90·7	18·9	1·1	12 13
Janet............ (S.)	4	Nov. 23, '04	258	16·7	4,335	3·88	198·23	39 65	6 20	45 85	1,917	13,480	1,089	4	40 46	93·3	20·9	·9	7 62
Poupée.............(C.)	2	Jan. 16, '05	142	17·7	2,522	3·97	115·88	22 16	3 61	25 77	918	5,375	586	4	20 59	81·6	17·8	2·2	5 39
Duchesse......... (C.)	4	July 21, '04	235	18·4	4,332	3·65	186·47	37 29	6 21	43 50	1,801	13,480	1,089	4	39 30	90·7	21·08	*1·08	5 18
Clatford Spot...... (G.)	11	June 10, '05	254	15·1	3,846	4·15	176·	35 20	5 45	40 65	1,887	13,180	1,089	4	39 86	103·7	22·6	*2·6	4 20
Duchess ....(S.)	4	Nov. 27, '04	192	17·4	3,346	3·91	142·51	29 50	4 80	34 30	1,819	13,790	1,089	4	39 79	118·	27·8	*7·8	0 79
Illuminata..........(S.)	5	Apr. 18, '05	31	3·5	109	3·76	4·10	0 97	0 16	1 13	1,253	13,480	1,089	4	33 82	.....	....	....	*5 49
																			*32 69

* Loss.

Shorthorns—																			
Marchioness	11	Mar. 4, '05	302	23·7	7,177	3·68	311·27	62 25	10 40	72 65	2,344	14,290	1,134	4	45 70	63·6	14·6	5·4	26 95
Darlington	3	Oct, 21, '04	222	21·9	4,862	3·71	212·47	42 29	6 97	49 46	1,696	9,640	1,089	4	34 41	70·7	16·1	3·9	15 05
Jessica	4	Feb. 9, '05	252	16·2	4,112	4·05	196·09	39 21	5 54	44 75	1,615	13,170	1,089	4	37 13	90·7	18·9	1·1	7 62
Average	..	....	259	20·8	5,834	3·81	239·94	47 92	7 64	55 62	1,885	12,367	1,104	4	39 08	75·	16·5	3·5	16 54
Ayrshires—																			
Denty	6	Mar. 2, '05	301	28·2	8,509	4·05	405·67	81 12	12 17	93 29	2,242	13,790	1,089	4	44 02	51·7	10·8	9·2	49 27
Maggie	9	Feb. 21, '05	286	32·	9,152	3·66	395·	79 00	13 13	92 13	2,257	13,789	1,089	4	44 16	48·2	11·1	8·9	47 97
Jessie A	11	Feb. 23, '05	273	33·2	9,165	3·54	382·16	76 43	13 07	89 50	2,257	13,790	1,135	4	44 33	48·3	11·5	8·5	45 17
Average	..	....	287	28·7	8,942	3·75	394·28	78 85	12 79	91 64	2,252	13,787	1,104	4	44 17	49·2	11·1	8·9	47 47
Guernseys—																			
Itchen Lady	8	Apr. 29, '05	281	29·2	8,211	4·34	420·	84 00	11 68	95 68	1,920	13,480	1,089	4	40 49	49·3	9·6	10·4	55 19
Deanie	8	Nov. 30, '04	315	24·3	7,679	4·33	391·92	78 38	10 93	89 31	2,030	13,170	1,089	4	41 28	53·7	10·5	9·5	48 03
Flossie Lyons	5	Feb. 14, '05	293	21·	6,154	5·18	375·20	75 04	8 66	84 70	1,895	12,570	1,089	4	39 33	63·8	10·4	9·6	44 37
Average	..	....	296	24·8	7,348	4·62	395·70	79 14	10 42	89 89	1,948	13,073	1,089	4	40 33	55·6	10·2	9·8	49 20
Canadians—																			
Fortune	9	Dec. 26, '04	283	28·9	8,179	4·23	407·25	81 45	11 65	93 10	2,017	13,430	1,089	4	41 41	50·6	10·1	9·9	51 69
Zamora	9	July 2, '05	297	24·2	7,217	4·76	404·78	80 95	10 21	91 16	2,319	12,800	1,008	4	43 51	60·2	10·7	9·3	47 65
Exilée	10	....	103	37·01	3,815	4·82	183·17	36 63	5 44	42 07	829	3,980	.....	4	16 27	45·	8·8	11·2	25 80
Average	..	....	228	30·	6,404	4·60	331·73	66 34	9 10	75 44	1,722	10,070	.....	4	33 73	51·9	9·9	10·1	41 71
Ayrshire Grades—																			
Countess	7	June 18, '05	261	26·5	6,929	3·92	319·74	63 94	9 91	73 85	2,040	13,790	1,089	4	42 00	60·6	13·1	6·9	31 85
Alice	4	Mar. 28, '05	307	21·9	6,727	3·35	265·58	53 11	9 69	62 80	1,559	13,170	1,089	4	36 57	54·3	13·2	6·8	26 23
Laura	9	Apr. 6, '05	215	29·2	6,373	3·27	245·21	49 04	9 19	58 23	1,432	13,170	1,089	4	35 30	55·3	14·3	5·7	22 93
Average	..	....	261	25·8	6,676	3·51	276·84	55 36	9 59	64 96	1,677	13,376	1,089	4	37 96	56·7	13·5	6·5	27 00
Shorthorn Grades—																			
Cherry	5	Sept. 14, '04	252	26·8	6,767	3·98	317·22	63 44	9 50	72 94	1,859	13,550	1,089	4	39 96	59·5	12·5	7·5	32 98
Rosy	6	Jan. 9, '05	300	22·2	6,679	3·54	278·76	55 75	9 60	65 35	1,817	13,170	1,089	4	39 15	58·6	13·1	6·9	29 59
Average	..	....	276	24·5	6,723	3·76	288·	59 60	9 55	69 15	1,838	13,360	1,089	4	39 55	59·	12·8	7·2	29 59
Guernsey Grades—																			
Queenie	7	Apr. 5, '05	308	20·1	6,204	6·08	444·	88 80	8 64	97 44	1,767	12,570	1,089	4	38 05	61·3	8·5	11·5	59 39
Belle Flower	7	Mar. 11, '05	309	27·9	8,621	4·14	425·17	85 03	12 29	97 32	2,127	13,500	1,098	4	42 60	51·6	10·1	9·99	54 72
Alma	4	Feb. 5, '05	305	22·8	6,960	4·73	380·00	76 00	9 87	85 47	2,050	12,870	1,089	4	41 18	59·1	10·8	9·2	44 69
Average	..	....	307	23·6	7,262	4·98	416·39	83 28	10 27	93 41	1,981	12,980	1,092	4	40 61	57·3	9·8	10·2	52 93

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* Loss.

FEEDING DAIRY CATTLE.

For the Canadian dairy farmer the chief aim in his feeding operations for milk production must ever be to produce the milk at as low a cost as possible. A not uncommon error, however, if one may judge by the average returns from Canadian dairy herds, is to attempt to lower cost by so decreasing the amount of food fed or by supplying food of such poor quality as to make heavy milk yields impossible. Profitable milk yields and very light rations do not go together. An abundance of food low in nutritive value is equally certain to prove unsatisfactory. To illustrate, a cow with the capacity to consume 25 lbs. of dry matter per day will not be profitable if fed only 20 lbs. per day. Neither will she be likely to prove more profitable even though she receive the 25 lbs. of dry matter per day if that dry matter be made up chiefly of such coarse forage as straw and chaff. It must be borne in mind, however, that it is quite possible to feed too heavy a ration and also that one may easily feed a ration too rich in nutritive elements as for instance by feeding too large a proportion of meal in the ration.

Our experiments and experience go to show that certain qualities should characterize rations for dairy cows if they are to prove satisfactory. In the first place the food should be so abundant as to quite satisfy the cow without encouraging her to leave anything over. In the second place it should be so palatable as to induce her to eat all she can get. Lastly it should be so high in food value as to insure a sufficient amount of material for milk production being left after life has been maintained. The best and most available aids to palatability at the command of the farmer are succulent feeds, such as roots and ensilage; while clover hay and bran are usually the most economical sources of such nutritive elements as are most essential for milk production.

Of succulent feeds there is usually a sufficiency in summer, but even the summer supply frequently falls short in such districts as are heavily stocked. Of the two seasons it is quite certain that an abundance of green feed in summer is even more important than in winter, hence the necessity of every dairy farmer making provision by means of soiling crops of (1) pease and oats, (2) oats and vetches, (3) pease, oats and vetches, (4) clover, (5) alfalfa, (6) green corn or (7) white turnips, or possibly better still by means of (8) the summer silo filled with corn or clover ensilage.

In winter, in addition to corn, clover or other ensilage, sugar beets, mangels and turnips may be provided and are certain to prove profitable additions to the dry ration usually fed.

The value of a small amount of such succulent food in winter can scarcely be overestimated. Where it is desired to feed stock very cheaply, yet in such a way as to insure good returns during the winter and good preparation for the next summer's work, ensilage or roots are certainly the most economical foods that can be used.

The amount of such foods to use will depend chiefly upon the supply, since the ration might quite easily include as much as 50 lbs. roots or 40 lbs. ensilage per average sized adult animal. Hence if all of such food as could be fed were to be fed, a supply of from 5 to 8 tons should be provided for each full grown cow. This would of course provide for summer as well as for winter feeding.

In feeding succulent foods probably the best preparation is to mix chaff, cut straw or cut hay in the proportion of 5 lbs. of one of them or a mixture of all three to 100 ensilage, or pulped roots or a mixture of the two. Probably the best roughage ration possible of preparation would be cut clover 5 lbs., pulped sugar beets 40 lbs., ensilage 60 lbs., mixed every second day in quantities sufficient for 48 hours feed and mixed, if possible, 6 hours before the first feed is to be fed therefrom. Mangels are exceedingly valuable as feed for cows but not equal to sugar beets. Sugar beets it must be remembered, however, cost more per ton to produce. Turnips are not to be recommended for cows whose milk is to be manufactured into butter or cheese nor for herds from which cream is to be sold. Corn ensilage is probably about the best that could be provided. A mixture of good corn and second growth clover is, however, even more to be desired than pure corn ensilage. Clover ensilage if well made is of very high feeding value but is generally more difficult to procure of good quality than the corn ensilage where corn will grow to a fair state of maturity. Pease and oats cut in the milk stage of the oats will make fair ensilage as will almost any other cereal and legume mixture cut at the same stage, but such mixtures seem to be rather unsatisfactory and are not commonly used.

For concentrates or meal feeds the common farm grains, oats, barley and pease do very well, particularly for summer feeding. In winter the addition of bran, shorts, oil meal, gluten, or cottonseed meal has been found to give excellent returns.

The amount to feed should depend upon the possibilities of the cow as a milk producer and upon the stage she has reached in the lactation period. Very heavy meal rations are not as a rule as profitable as those of medium character.

The meal had better be fed along with the roughage.

KEEPING RECORDS.

The effort to interest dairymen in the returns from their individual cows has been continued, and many farmers seem to be awakening to a knowledge of the fact that the improvement of the whole herd demands the study of the unit; that is, a close acquaintance with the expenditure upon the individual cow and the returns from the same.

This can be determined in no other way than by keeping an exact record of the daily milk yield. A record of the daily food consumption would also be of great use if it could be kept.

Many farmers who have been keeping such records for some time report very strongly in favour of this line of work.

As soon as the farmer sets to work to know what his cows are doing by keeping a record he finds himself much more closely in touch with his business. He sees at once the effect of better care and better feeding. He notes the great difference in returns between the best and the worst cows in his herd and cannot help but determine to get rid of the poor ones and replace them with good ones. Even the poor cows are improved because better feeding is almost certain to be tried and quite certainly poor feeding is responsible for many of our unprofitable dairy cows and even for many unprofitable dairy herds.

To facilitate the keeping of such records and to help in the building up of dairying interests in Canada forms similar to the following are supplied on application:—

DAIRY MILK RECORD.

Herd belonging to..................................
Post Office ....
Record for week ending...........................

(This form supplied free by Live Stock
Division, Central Experimental
Farm, Ottawa, Ont.)

COWS.

Day.	Time.																	Total for Day.
Sunday	Morning																	
	Evening																	
Monday	Morning																	
	Evening																	
Tuesday	Morning																	
	Evening																	
Wednesday	Morning																	
	Evening																	
Thursday	Morning																	
	Evening																	
Friday	Morning																	
	Evening																	
Saturday	Morning																	
	Evening																	
Total	Week																	

(Reverse)

CENTRAL EXPERIMENTAL FARM.

Wm. Saunders, Director. J. H. Grisdale, Live Stock and Agriculture.

MILK RECORDS.

1. The profitable dairy cow must give over 5,000 pounds of milk each year. To know the value of a cow, her total annual yield of milk must be known. The only way to know this is to keep a record of her daily milk yield.

2. The form on the other side of this sheet is intended to help progressive dairy farmers by supplying them with a simple and convenient sheet for the keeping of the milk records of their individual cows. A study of such records will soon indicate which cows should go to the butcher. We would be pleased to receive a summary of your record. If you have no summary forms write us.

3. Such records are being kept by hundreds of successful dairymen to-day. Many of these men attribute their success to the keeping of such records. Why not give the thing a trial if you are a dairyman? It will increase your milk product. It will lighten your labour since your interest will be increased in your work, and 'interest lightens labour.' It will show you the unprofitable cow the 'boarder.' You cannot get rid of her too quickly.

4. For weighing the milk a simple spring balance may be secured for from one to three dollars. If your local dealer cannot supply you, write the undersigned for particulars. A small platform scale is fairly convenient, but we find the spring balance preferable.

5. Many farmers keep records of the amount of food fed to individual cows. If you would like to do so, sample forms would be sent free on writing J. H. Grisdale, Agriculturist, Central Experimental Farm, Ottawa, Ont.

VALUES OF FOODS FOR MILK PRODUCTION.

During the year a number of different bye-products recommended by the manufacturers who put them on the market as particularly valuable for milk production, have been given a trial.

Those tried this year upon which we think it advisable to report are: 'Spirit Grains,' a bye-product from distilleries; 'Meal Seeds,' small grain and more or less refuse and weed seeds ground together a bye-product from cereal foods factories ; and 'Pea Dust,' another bye-product from cereal foods factories, being the small peas broken parts, &c., of peas not suitable for sale as prepared peas of some description.

MEAL SEEDS.

Four Shorthorn cows were taken and a record of their work for 11 days previously is shown. They were fed the same roughage as usual for 17 days longer but in the place of the usual meal ration of bran 600 lbs., oats 300 lbs., and oil meal 300 lbs. at the rate of about 8 lbs. per day, they were given an equal amount of 'Meal Seeds.'

The cattle did not like the meal seeds quite so well as the regular meal ration. The data given below show the estimation in which this bye-product may be held as a feed for cows in milk. The reader will remember that under even the best conditions cows in milk are likely to fall off about 5 per cent in the time occupied by the experiment.

Number of cows under test	4	
Average meal ration (bran, oats, oil meal before test)	8	lbs.
Average hay ration before test	5	"
Average ensilage and roots ration before test	70	"
Average yield of milk per day during 11 days while on regular meal ration	88 6/11	"
Milk produced by group first day of 11-day period	90	"
Milk produced by group average of last 7 days before feeding 'Meal Seeds'	88	"
Average yield of milk per day for 17 days while being fed 'meal seeds'	80 1/3	"
Average yield of milk per day during first week on 'meal seeds'	83 5/7	"
Average yield of milk per day during last three days on 'meal seeds'	78 1/2	"
Rate of decrease	10%	
Normal rate of decrease for period	5%	

The above data show a tendency on the part of cows to decrease considerably more rapidly than they should be doing, due no doubt to their being on a meal ration of 'meal seeds.' We may fairly safely conclude, therefore, that as a sole meal feed for cows in milk they are not to be very highly recommended. They might, of course, be fed to some profit if mixed with other concentrates so that they made up only a part of the meal ration.

SPIRIT GRAINS.

Four cows of different breeding were taken and a record of their work for 11 days previously is shown. They were then fed the same roughage as usual for 17 days, but in the place of the usual meal ration of bran 600 lbs., oats 300 lbs., and oil meal 300 lbs. at the rate of about 8 lbs. per day, they were given an equal amount of 'spirit grains.' The cattle liked the 'spirit grains' quite well, and the results speak for themselves, it being remembered, of course, that milking cows were likely to fall off about 5 per cent in time covered by the experiment.

Number of cows under test	4	
Average meal ration (bran, oats, oil meal before test)	8	lbs.
Average hay ration before test	5	"
Average ensilage and roots before test	60	"
Average yield of milk per day for 11 days before feeding of 'spirit grains' began	80 1/3	"
Milk yielded by group first day of 11-day period	81 1/4	"
Milk yielded by group average of last 7 days before feeding 'spirit grains'	79 5/7	"
Average yield of milk per day for 17 days while being fed 'spirit grains'	79 3/4	"
Average yield of milk per day during first week on 'spirit grains'	75 4/7	"
Average yield of milk for last 3 days on 'spirit grains'	83	"
Rate of decrease	1/2%	
Normal rate of decrease for period	5%	

The above data appear to show a tendency on the part of the cattle to increase in milk flow while being fed 'spirit grains' once the effects of the change of feed was passed. Such a tendency on the part of cows being fed a certain ration is exactly what indicates a good sort of food being fed. Since the only change made in the ration was in the substitution of 'spirit grains' for meal, 'spirit grains was evidently a good food.

PEA DUST.

Four cows of different breeding were used in the trial. To make a comparison of 'pea dust' with the regular ration made up of bran 6 parts, oats 3 parts and oil meal 3 parts possible a record is given of the feed and milk for 11 days immediately previous to the 17 days during which the regular meal ration was replaced by 'pea dust.'

The 'pea dust' was not very well liked by the animals and some little difficulty was experienced in getting them to eat as great a weight of it as they had been eating of the regular meal mixture. The data given below show the estimation in which this bye-product may be held as a feed for cows in milk. It will, of course, be remembered that under favourable conditions cows might be expected to fall off about 5 per cent in the time covered by the experiment.

Number of cows under test..	4	
Average meal ration (bran, oats, oil meal before test)....	8	lbs.
Average hay ration before test..	5	"
Average ensilage and roots ration before test..	60	"
Average yield of milk per day during 11 days while on regular meal ration..	$88\frac{4}{11}$	"
Milk produced by group first day of 11-day period..	$89\frac{1}{2}$	"
Milk produced by group average of last 7 days before being fed 'pea dust'..	$87\frac{5}{7}$	"
Average yield of milk per day for 17 days while being fed 'pea dust'..	$84\frac{1}{3}$	"
Average yield of milk per day for first week while being fed 'pea dust'..	$85\frac{4}{7}$	"
Average yield of milk per day for last 3 days while being fed 'pea dust'..	$85\frac{1}{3}$	"
Rate of decrease..	$4\frac{1}{2}$%	
Normal rate of decrease for period..	5%	

The above data show that 'pea dust,' in spite of being somewhat unpalatable to cows is a most excellent ration for milk production. The cows, though not eating quite as much of the 'pea dust' as of the regular meal, did quite as well when fed on 'pea dust' as when on the regular meal mixture.

FEEDING REFUSE APPLES TO DAIRY COWS.

Another test has been made of the value of apples as a food for milk production. Apples were fed at the rate of 22 lbs. per day during 4 weeks, with the result that there was a slight increase in the rate of milk production as compared with a considerable decrease when apples were not fed. The following table gives all data of the experiment:—

—		METHOD OF FEEDING.						SUMMARIES.	
		1st period of 1 week.		2nd period of 2 weeks.		3rd period of 2 weeks.			
		Group A.	Group B.	Group A.	Group B.	Group A.	Group B.	Summary.	Summary.
		Preliminary.	Preliminary.	Fed Apples.	No Apples.	Fed Apples.	No Apples.	Fed Apples.	No Apples.
		Number in group, 3.	Number in group, 3.	Number in group, 3.	Number in group, 3.	Number in group, 3.	Number in group, 3.	Number in group, 3.	Number in group, 3.
Average weight to start period	Lbs.	972	978	953	955	993	985	969	969
Average weight at end of period	"	953	955	993	985	1,022	1,015	1,004	1,003
Loss — or gain	"	— 19	— 23	+ 40	+ 30	+ 29	+ 30	+ 35	+ 34
Meal fed group in 1 day	"	18	18	18	18	18	18	18	18
Hay fed group in 1 day	"	9	9	9	9	9	9	9	9
Ensilage fed group in 1 day	"	120	115	48	130	104	45	46$\frac{1}{2}$	117
Apples fed group in 1 day	"	....	....	60	....	....	75	67$\frac{1}{2}$	....
Meal fed group in period	"	126	126	252	252	252	252	252	252
Hay fed group in period	"	63	63	126	126	126	126	126	126
Ensilage and roots fed group in period	"	840	810	672	1,820	1,455	630	651	1,638
Apples fed group in period	"	....	....	840	....	....	1,100	970	....
Value of feed fed group in period	$	2 31	2 28	4 76	4 76	4 40	4 40	4 58	4 58
Value of feed fed 1 cow in 1 day	Cts.	11	11	10$\frac{1}{2}$	10$\frac{1}{2}$	10$\frac{1}{2}$	10$\frac{1}{2}$	10$\frac{1}{2}$	10$\frac{1}{2}$
Milk produced by group in period	Lbs.	370	321	802$\frac{1}{2}$	711	766	676	739	738
First day's milk from group	"	50	45	56	48$\frac{1}{2}$	58$\frac{1}{2}$	48$\frac{1}{2}$	52$\frac{1}{4}$	53$\frac{1}{2}$
Second " "	"	54$\frac{1}{2}$	44$\frac{1}{2}$	57	54	58$\frac{1}{2}$	49$\frac{1}{2}$	53$\frac{1}{4}$	56$\frac{1}{4}$
Average daily yield of group during 1st week	"	52$\frac{6}{7}$	45$\frac{6}{7}$	57	50$\frac{5}{7}$	57$\frac{3}{7}$	49	53	54
" " 2nd week	"	....	....	57$\frac{3}{4}$	51	52	47$\frac{3}{7}$	52$\frac{4}{7}$	51$\frac{1}{2}$
" " 2 weeks	"	....	....	57$\frac{2}{7}$	50$\frac{5}{7}$	54$\frac{5}{7}$	48$\frac{2}{7}$	52$\frac{3}{4}$	52$\frac{5}{7}$
Next to last day's milk from group	"	53	47	60	51$\frac{1}{2}$	54	48	54	52$\frac{3}{4}$
Last day's milk from group	"	55	49$\frac{1}{2}$	56$\frac{1}{2}$	48$\frac{1}{2}$	51$\frac{1}{2}$	47$\frac{1}{2}$	52	50
Change in rate of daily milk yield in 2 weeks	"	+ $\frac{1}{2}$	+ 3	+ 3	— 1$\frac{1}{2}$	— 5$\frac{3}{4}$	— 1$\frac{1}{4}$	+ $\frac{1}{4}$	— 3$\frac{1}{2}$
Per cent change in rate of daily milk yield	p. c.	+ 1	+ 6$\frac{2}{3}$	+ 3	— 2$\frac{1}{2}$	— 10	— 2$\frac{1}{2}$	+ $\frac{1}{2}$	— 7

BEEF PRODUCTION.

EXPERIMENTS IN 1903-4.

The lines of experiment followed in the winter of 1903-4 were:—Influence of age on cost of beef; influence of manner of housing, *i.e.,* feeding loose vs. feeding tied; baby beef; values of feeds.

The steer feeding operations may be considered successful from a financial point of view since the selling price covered the cost of the steers, the cost of the feed at market prices, and left a good margin for profit. Full particulars are given in the group reports.

Of course it must always be remembered in reading the reports that the cost of caring for and feeding the steers is not included in the estimate of the cost of production. There is not the least doubt but that where feeding operations are conducted in such a manner as to require a reasonable amount of labour for the number of animals fed the manure is of a value quite equal to the cost of the labour.

In our beef feeding operations here high values are put on hay, straw ensilage and roots, while the market prices are charged for meal of all kinds. If only cost of production were charged for the straw, hay, roots, ensilage and such meal as is produced on the farm a very much higher margin of profit could be shown and there would still be saved the cost of marketing, a no small item for roots, hay and straw, to say nothing of ensilage. Further, by beef feeding operations where it is not convenient or not desired to keep dairy cattle on the farm much valuable fertilizing material is kept on the farm that would otherwise have been lost, hence the feeder should be satisfied with somewhat smaller returns than might be expected from the sale of the raw material.

SHORT FEED VS. LONG FEED.

Not infrequently the feeder when starting his operations in the fall is uncertain as to whether he should try to fit for an early or a late market. Generally speaking it may be said that steers rushed for an early market put on gains considerably more cheaply than those fed for a longer time. Further, steers fed for a short period are likely to consume relatively more roughage in comparison with the necessary meal than are those fed for a long period. To illustrate the two points made, lot A (discussed below) fed for 127 days cost $6.76 to lay on 100 lbs. of increase in live weight and consumed only 4,937 lbs. of meal along with 68,328 lbs. roots and ensilage about 1 of meal to 14 of roots and ensilage, while lot B, fed for 202 days consumed 10,356½ lbs. meal along with only 91,558 lbs. ensilage and roots or about 1 of meal to 9 of roots and ensilage. The rates of gain as will be seen below were practically the same.

Lot 'A'—Short Feed Steers.

Number of steers in lot..........................	9	
First weight, gross, Nov. 12, 1904..............	10,880	lbs.
First weight, average..........................	1,209	"
Finished weight, gross, Mar. 21, 1905..........	12,995	"
Finished weight, average.......................	1,444	"
Total gain in 127 days.........................	2,115	"
Average gain per steer.........................	235	"
Daily gain for lot, 9 steers.....................	16·65	"
Daily gain per steer...........................	1·85	"
Gross cost of feed.............................	$ 143 15	
Cost of 100 lbs. gain..........................	6 76	
Cost of steers, 10,880 lbs. at $4 per 100 lbs..........	435 20	
Total cost to produce beef......................	578 35	
Sold, 12,995 lbs. at $5 per 100 lbs., less 4 per cent.....	623 80	
Profit on lot..................................	45 45	

Net profit per steer	$ 5 05	
Average buying price per steer	48 35	
Average selling price per steer	69 30	
Average increase in value	20 95	
Average cost of feed for steer	15 90	
Amount of meal eaten by lot of 9 steers	4,937	lbs.
Amount of ensilage and roots	68,328	"
Amount of hay	7,092	"
Amount of straw eaten	252	"

Lot 'B'—Long Feed Steers.

Number of steers in lot	9	
First weight, gross, Nov. 12, 1904	9,380	lbs.
First weight, average	1,042	"
Finished weight, gross	12,720	"
Finished weight, average, June 2, 1905	1,413	"
Total gain in 202 days	3,340	"
Average gain per steer	371	"
Daily gain per steer	1·83	
Daily gain for lot, 9 steers	16·53	
Gross cost of feed	$ 246 74	
Cost of 100 lbs. gain	7 38	
Cost of steers, 9,380 lbs. at $4 per 100 lbs.	375 20	
Total cost to produce beef	621 94	
Sold, 12,720 lbs. at $6 per 100 lbs., less 4 per cent.	732 72	
Profit on lot	110 78	
Net profit per steer	12 31	
Average buying price per steer	41 69	
Average selling price per steer	81 49	
Average increase in value	39 80	
Average cost of feed for steer	27 41	
Amount of meal eaten by lot of 9 steers	10,356½	lbs.
Amount of ensilage and roots	91,558	"
Amount of hay	14,656	"
Amount of straw eaten	126	"

INFLUENCE OF AGE ON COST OF BEEF.

Cost of producing beef with three-year olds, two-year olds, yearlings and calves.

Since in connection with other work in steer feeding an opportunity occurred to give the influence of age on cost of beef production another trial, it was done, and reported on below in detail.

A study shows the following peculiarities revealed:—

Ages.	Daily Gain.	Cost 100 lbs. Gain.
	Lbs.	$ cts.
Three-year-olds	1·65	6 52
Two-year-olds	2·16	5 99
Yearlings	2·00	4 30
Skim milk calves, new born under 8 months	1·54	3 40

Lot 'C'—(Three-year Olds).

Number of steers in lot	9
First weight, gross	10,875 lbs.
First weight, average	1,208 “
Finished weight, gross	12,760 “
Finished weight, average	1,418 “
Total gain in 127 days	1,895 “
Average gain per steer	210 “
Daily gain for lot, 9 steers	14.88 “
Daily gain per steer	1.65 “
Gross cost of feed	$123 61
Cost of 100 lbs. gain	6 52
Cost of steers, 10,875 lbs. at 4c. per 100 lbs	434 00
Total cost to produce beef	557 61
Sold, 13,035 lbs. at $5 per 100 lbs., less 4 per cent	625 70
Profit on lot	68 09
Net profit per steer	7 55
Average buying price per steer	48 22
Average selling price per steer	69 52
Average increase in value	21 30
Average cost of feed for steer	13 73
Amount of meal eaten by lot of 9 steers	3,318 lbs.
Amount of ensilage and roots	67,536 “
Amount of hay	6,930 “
Amount of straw eaten	252 “

Lot 'D'—Two-year-olds.

Number of steers in lot	7
First weight, gross	7,490 lbs.
First weight, average	1,070 “
Finished weight, gross	9,415 “
Finished weight, average	1,345 “
Total gain in 127 days	1,925 “
Average gain per steer	275 “
Daily gain for lot, 7 steers	15·15 “
Daily gain per steer	2·16 “
Gross cost of feed	$ 109 51
Cost of 100 lbs. gain	5 99
Cost of steers, 7,490 lbs. at $4 per 100 lbs	299 60
Total cost to produce beef	409 11
Sold, 9,415 lbs. at $5 per 100 lbs., less 4 per cent	451 95
Profit on lot	42 84
Net profit per steer	6 12
Average buying price per steer	42 80
Average selling price per steer	64 76
Average increase in value	21 96
Average cost of feed for steer	15 64
Amount of meal eaten by lot of 7 steers	2,635 lbs.
Amount of ensilage and roots	50,116 “
Amount of hay	9,443 “

Lot 'E'—Steers over 8 Months Old.

Number of steers in lot	6
First weight, gross	2,900 lbs.

First weight, average	483	lbs.
Finished weight, gross	5,220	"
Finished weight, average	870	"
Total gain in 193 days	2,320	"
Average gain per steer	387	"
Daily gain for lot, 6 steers	12	"
Daily gain per steer	2	"
Gross cost of feed. Dec. 1, 1904, to June 12, 1905	$ 99 76	
Cost of 100 lbs. gain, Dec. 1, 1904, to June 12, 1905	4 30	
Average cost of feed for steer, Dec. 1, 1904, to June 12, 1905	16 63	
Amount of meal eaten by lot of 6 steers	4,682	lbs.
Amount of ensilage and roots	33,910	"
Amount of hay	5,388	"

Meal consumed consisted of: Oats, 1,509 lbs.; oil meal, 984 lbs.; bran, 1,785 lbs.; corn, 276 lbs.; shorts, 138 lbs.

Lot 'F'—Steers under 8 Months Old.

Number of steers in lot	5	
First weight, gross, May 12, 1905	795	lbs.
First weight, average	159	"
Finished weight, gross, Dec. 1, 1905	2,345	"
Finished weight, average	469	"
Total gain in 201 days	1,550	"
Average gain per steer	310	"
Daily gain for lot, 5 steers	7·71	"
Daily gain per steer	1·54	"
Gross cost of feed	$ 52 70	
Cost of 100 lbs. gain	3 40	
Average cost of feed for steer	10 54	
Amount of meal eaten by lot of 5 steers	2,210	lbs.
Amount of ensilage and roots	6,790	"
Amount of hay	2,055	"
Amount of skim milk	11,350	"

EXPERIMENTS WITH BABY BEEF.

The experiments to determine the cost of producing beef at an early age have been continued and are reported upon below.

BEEF FROM STEERS AT 2 YEARS OLD.

The first reports submitted in this line are those that have to do with calves dropped in April, 1903. These reports speak for themselves.

Lot 'G'—Limited Growing Ration Steers, Dropped in 1903.

Number of steers in lot	5	
First weight, gross, Dec. 1, 1904	3,690	lbs.
First weight, average	738	"
Finished weight, gross, June 26, 1905	5,200	"

Finished weight, average	1,040 lbs.
Total gain in 207 days	1,510 “
Average gain per steer	302 “
Daily gain for lot, 5 steers	7·20 “
Daily gain per steer	1·46 “
Gross cost of feed	$ 94 89
Cost of 100 lbs. gain	6 28
Average cost of feed per steer for 207 days	18 98
Amount of meal eaten by lot of 5 steers	2,782 lbs.
Amount of ensilage and roots	45,139 “
Amount of hay	5,354 “
Amount of straw eaten	1,181 “

Meal consumed consisted of: Oats, 262 lbs.; corn, 840 lbs.; oil meal, 560 lbs.; bran, 350 lbs.; shorts, 455 lbs.; mixed crop, 315 lbs.

Lot ‘H’—Full Fattening Ration, Dropped April, 1903.

Number of steers in lot	5
First weight, gross, Dec. 1, 1904	4,950 lbs.
First weight, average	990 “
Finished weight, gross, Mar. 20, 1905	5,865 “
Finished weight, average	1,173 “
Total gain in 110 days	915 “
Average gain per steer	183 “
Daily gain for lot, 5 steers	8·30 “
Daily gain per steer	1·66 “
Gross cost of feed, Dec. 1, 1904 to Mar. 20, 1905	$ 66 64
Cost of 100 lbs. gain	7 28
Average cost of feed for steer	19 73
Amount of meal eaten by lot of 5 steers	5,444 lbs.
Amount of ensilage and roots	36,973 “
Amount of hay	5,130 “
Amount of straw eaten	481 “

Meal consumed consisted of: Oats, 272 lbs.; oil meal, 1,648 lbs.; bran, 2,029 lbs.; shorts, 522 lbs.; mixed meal, 514 lbs.; corn, 459 lbs.

Lot ‘I’—Full Fattening Ration, Dropped April, 1903.

Number of steers in lot	5
First weight, gross, May 1, 1903	565 lbs.
First weight, average	113 “
Finished weight, gross	6,480 “
Finished weight, average	1,296 “
Total gain in 766 days	5,915 “
Average gain per steer	1,083 “
Daily gain for lot, 5 steers	7·72 “
Daily gain per steer	1·54 “
Gross cost of feed	$ 285 91
Cost of 100 lbs. gain	4 83
Cost of steers	25 00
Total cost to produce beef $25 + $285.91	310 91
Sold, 6,480 lbs. at $6 per 100 lbs., less 4 per cent	373 26
Profit on lot	62 35

Net profit per steer	$12 47
Average buying price per steer	5 00
Average selling price per steer	74 65
Average increase in value	69 65
Average cost of feed for steer	57 18
Amount of meal eaten by lot of 5 steers	11,585 lbs.
Amount of ensilage and roots	81,805 “
Amount of hay	8,800 “
Amount of straw eaten	2,021 “
Amount of sugar beet pulp (dried)	378 “
Green feed (soiling crops)	9,408 “
Amount of skim milk	6,775 “
On pasture (lot)	1 Mo.

Meal consumed consisted of: Oats, 3,033 lbs.; bran, 3,416 lbs.; oil meal, 2,875 lbs.; shorts, 635 lbs.; gluten, 644 lbs.; corn, 459 lbs.; mixed meal (oats, pease, barley and wheat), 514 lbs.

Lot 'J'—Limited Growing Ration Steers, Dropped in 1903.

Number of steers in lot	5
First weight, gross	500 lbs.
First weight, average	100 “
Finished weight, gross	5,200 “
Finished weight, average	1,040 “
Total gain in 786 days	4,700 “
Average gain per steer	940 “
Daily gain for lot, 5 steers	5·95 “
Daily gain per steer	1·19 “
Gross cost of feed	$ 205 17
Cost of 100 lbs. gain	4 37
Cost of steers	25 00
Total cost to produce beef, $187.17 + $25	230 17
Sold, 5,200 lbs. at $5.50 per 100 lbs., less 4 per cent	274 56
Profit on lot	44 39
Net profit per steer	8 89
Average buying price per steer	5 00
Average selling price per steer	54 91
Average increase in value	49 91
Average cost of feed for steer	37 43
Amount of meal eaten by lot of 5 steers	5,122 lbs.
Amount of ensilage and roots	90,285 “
Amount of hay	8,931 “
Amount of straw eaten	2,371
Pasture (50 cents per month)	30 Mos.
Soiling crop	15,430 lbs.

BEEF FROM STEERS AT 13½ MONTHS. STEERS DROPPED APRIL, 1904.

The heavily fed lot of the 2 lots put on experiment May 1, 1904, were in such good shape in June, 1905, that it was decided to sell them, as $5.50 per 100 lbs. live weight was offered. Reports follow. The beef from these steers was exceedingly tender, very fat, and of excellent flavour.

Lot 'K'—(Limited Growing Ration Steers; Dropped April, 1904).

Number of steers in lot	6
First weight, gross	2,530 lbs.
First weight, average	422 “
Weight on going to grass, May 18, 1905	4,020 “
Average weight, May 18, 1905	670 “
Total gain in 169 days	1,490 “
Average gain per steer	248 “
Daily gain for lot, 6 steers	8.82 “
Daily gain per steer	1.47 “
Gross cost of feed, Dec. 1, 1904, to May 18, 1905	$58 66
Cost of 100 lbs. gain	3 95
Average cost of feed for steer	9 77
Amount of meal eaten by lot of 6 steers	1,478 lbs.
Amount of ensilage and roots	32,040 “
Amount of hay	2,574 “
Amount of straw eaten	1,684 “

Meal consumed consisted of: Oats, 467 lbs.; oil meal, 408 lbs.; bran, 603 lbs.

Lot 'L.'—Full Fattening Ration Steers, Dropped April, 1904.

Number of steers in lot	6
First weight, gross, Dec., 1904	2,900 lbs.
First weight, average	483 “
Finished weight, gross	5,220 “
Finished weight, average	870 “
Total gain in 193 days	2,320 “
Average gain per steer	387 “
Daily gain for lot, 6 steers	12 “
Daily gain per steer	2 “
Gross cost of feed, Dec. 1, 1904, to June 12, 1905	$99 76
Cost of 100 lbs. gain, Dec. 1, 1904, to June 12, 1905	4 30
Average cost of feed for steer, Dec. 1, 1904, to June 12, 1905	16 63
Amount of meal eaten by lot of 6 steers	4,682 lbs.
Amount of ensilage and roots	33,910 “
Amount of hay	5,388 “

Amount of meal consumed consisted of: Oats, 1,509 lbs.; oil meal, 974 lbs.; bran, 1,785 lbs.; corn, 276 lbs.; shorts, 138 lbs.

Lot 'M'—Full Fattening Ration Steers, Dropped April, 1904.

Number of steers in lot	6
First weight, gross, May 1, 1904	740 lbs.
First weight, average	123 “
Finished weight, gross	5,220 “
Finished weight, average	870 “
Total gain in 407 days	4,480 “
Average gain per steer	746 “
Daily gain for lot, 6 steers	11·00 “
Daily gain per steer	1·83 “
Gross cost of feed, Dec. 1, 1904, to June 12, 1905	$ 99 76

Cost of 100 lbs. gain, Dec. 1, 1904, to June 12, 1905	$4 30	
Cost of steers up to Dec 1, 1904—Feed, $59.83; buying price, $30	89 83	
Cost of 100 lbs. gain—May 1, 1904, to Nov. 30, 1904	2 77	
Total cost of steers at 407 days or 13½ months old	189 59	
Sold, 5,220 lbs. at $5.50 per 100 lbs., less 4 per cent	275 66	
Profit on lot	86 07	
Net profit per steer	14 34	
Average value of steer at birth	5 00	
Average selling price per steer	45 94	
Average increase in value, allowing $5 as value of calf when dropped	40 94	
Average cost of feed for steer	26 59	
Amount of meal eaten by lot of 6 steers in 407 days	6,707	lbs.
Amount of ensilage and roots	43,150	"
Amout of hay	6,900	"
Amount of green feed, clover, mixed crop cut green, rape, &c	9,408	"

Meal consumed consisted of: Oats, 2,289 lbs.; oil meal, 1,145 lbs.; bran, 2,523 lbs.; corn, 276 lbs.; shorts, 138 lbs.; barley meal, 336 lbs.

Lot 'N'—Limited Growing Ration Steers, Dropped April, 1904.

Number of steers in lot	6	
First weight, gross	490	lbs.
First weight, average	81	"
Total weight, May 18, 1905	4,020	"
Average weight, May 18, 1905	670	"
Total gain in 383 days	3,530	"
Average gain per steer	588	"
Daily gain for lot, 6 steers	9·18	"
Daily gain per steer	1·53	"
Gross cost of feed, Dec. 1, 1904, to May 18, 1905	$ 58 66	
Cost of 100 lbs. gain, Dec. 1, 1904, to May 18, 1905	3 95	
Cost of steers up to Dec. 1, 1904—Feed, $57.90; buying price, $30	87 90	
Cost of 100 lbs. gain, May 1, 1904, to Nov. 30, 1904	2 83	
Total cost of steers at 383 days or 12⅔ mos. old	146 56	
Value of steers May 18, 1905, going on grass 4,020 lbs. at 3½	140 70	
Loss on lot	5 86	
Net loss per steer	0 97	
Average buying price per steer	5 00	
Average value of steer at 12⅔ mos. old	23 45	
Average increase in value, allowing $5 value of calf when dropped	18 45	
Average cost of feed for steer	19 43	
Amount of meal eaten by lot of 6 steers	3,356	lbs.
Amount of ensilage and roots	42,882	"
Amount of hay	4,173	"
Amount of straw eaten	1,684	"
Amount of green feed, clover, mixed crop cut green, rape, &c	7,266	"

Meal consumed consisted of: Oats, 1,247 lbs.; oil meal, 504 lbs.; barley, 273 lbs.; bran, 1,332 lbs.

CALVES DROPPED APRIL, 1905.

These lots have not done quite so well as those dropped in 1904, but will, it is evident make excellent animals when 6 months older.

Lot 'O'—Limited Growing Ration, Dropped 1905.

Number of steers in lot	5	
First weight, gross, May 12, 1905	490	lbs.
First weight, average	98	"
Finished weight, gross, Dec. 1, 1905	1,800	"
Finished weight, average	360	"
Total gain in 201 days	1,310	"
Average gain per steer	262	"
Daily gain for lot, 5 steers	6·53	"
Daily gain per steer	1·30	"
Gross cost of feed	$ 46 97	
Cost of 100 lbs. gain	3 58	
Average cost of feed for steer	9 39	
Amount of meal eaten by lot of 5 steers	2,050	lbs.
Amount of ensilage and roots	5,720	"
Amount of hay	1,582	"
Amount of skim milk	10,825	"

Meal consumed consisted of: Oats, 733 lbs.; bran, 907 lbs.; barley, 228 lbs.; Gluten, 182 lbs.

Lot 'P'—Full Fattening Ration, Dropped 1905.

Number of steers in lot	5	
First weight, gross, May 12, 1905	795	lbs.
First weight, average	159	"
Finished weight, gross, Dec. 1, 1905	2,345	"
Finished weight, average	469	"
Total gain in 201 days	1,550	"
Average gain per steer	310	"
Daily gain for lot, 5 steers	7·71	"
Daily gain per steer	1·54	"
Gross cost of feed	$ 52 70	
Cost of 100 lbs. gain	3 40	
Average cost of feed for steer	10 54	
Amount of meal eaten by lot of 5 steers	2,210	"
Amount of ensilage and roots	6,790	"
Amount of hay	2,055	"
Amount of skim milk	11,350	"

Meal consumed consisted of: Oats, 840¾ lbs.; bran, 960 lbs.; and barley, 175 lbs.

SWINE FEEDING.

I have to report a rather unsuccessful year with swine. The rather poor showing made is due to various causes chief among them being the frequent change of men. The regular feeder was called away several times for considerable periods and it was not always possible to replace him with a man who could do the work satisfactorily, and very considerable losses were suffered.

The experiment with the small pig farm is being continued and will be reported upon more fully at a later date. A report of the crops grown on this area will be found on page 84.

EXPERIMENTS.

A number of swine are constantly being fed in an experimental way. The work done this year was along the lines of (1) economy of production, (2) type of pig as influenced by feed and environment or conditions under which they were fed.

Five lots of 5 pigs each were fed as follows:—

Lot 1. Meal, Alfalfa pasture.

Lot 2. Meal, clover pasture.

Lot 3. Meal, root pasture.

Lot 4. Meal *no* supplementary food in pens.

Lot 5. Meal, roots fed in pens.

Reports of the different lots follow. All pigs were fed on the same meal mixture shorts, 500 lbs.; oil meal, 30 lbs.; gluten, 10 lbs.

Lot 1—Alfalfa Pasture.

No. of pigs in lot	5	
Weight to start Sept. 10, 1905	529	lbs.
Average weight to start	106	"
Weight to finish Oct. 15, 1905	775	"
Average weight to finish	155	"
Total gain in 35 days	246	"
Average gain per pig in period of 35 days	49	"
Daily rate of gain	1·4	"
Food consumed in addition to pasture, meal	1,002	"
Cost of food	$ 9 02	
Cost of 100 lbs. gain	3 67	

The pigs had about ¼ acre of alfalfa.
Good effect on form and health of animals.

Lot 2—Red Clover Pasture.

No. of pigs in lot	5	
Weight to start, Sept. 10, 1905	455	lbs.
Average weight to start	91	"
Weight to finish Oct. 15, 1905	716	"
Average weight to finish	143	"
Average gain per pig in 35 days	52	"
Total gain in 35 days	259	"
Daily rate of gain	1·5	"
Food consumed in addition to pasture, meal	1,012	"
Value of food apart from pasture	$9 10	
Cost of 100 lbs. gain, pasture neglected	3 52	

The pigs had about ¼ acre of clover.
Good effect on form and health of animals.

Lot 3—Root Pasture.

Mangels, sugar mangels, sugar beets, carrots and turnips.

No. of pigs in lot	5	
Weight to start Sept. 10, 1905	509	lbs.
Average weight to start	102	"
Weight to finish Oct. 15, 1905	745	"
Average weight to finish	149	"
Total gain in 35 days	236	"
Average gain per pig in 35 days	47	"
Daily rate of gain	1.31	"
Food consumed in addition to pasture	1,002	"
Value of food apart from pasture	$9 02	
Cost of 100 lbs. gain, pasture neglected	3 82	

Pigs ate roots of all kinds but turnips quite greedily, following them down quite deep into the ground in the case of sugar beets and carrots. In the 35 days they ate the roots off an area of 77 feet long and 40 feet wide. This system of feeding has a tendency to develop the paunch and must be used with caution.

Lot 4—No Pasture—(Fed in Pens).

No. of pigs in lot	5	
Weight to start Sept. 10, 1905	248	lbs.
Average weight to start	50	"
Weight to finish Oct. 15, 1905	501	"
Average weight to finish	100	"
Total gain in 35 days	253	"
Average gain per pig	$50\frac{3}{5}$	"
Daily rate of gain	1.45	"
Food consumed, meal	1,202	"
Value of food	$10 81	
Cost of 100 lbs. gain	4 23	

This method of feeding seemed to have a tendency to make rather short flabby pigs.

Lot 5—Roots and Meal (Fed inside).

No. of pigs in lot	5	
Weight to start Sept. 10, 1905	262	lbs.
Average weight to start	52	"
Weight to finish Oct. 15, 1905	570	"
Average weight to finish	114	"
Total gain in 35 days	308	"
Average gain per pig	$61\frac{3}{5}$	"
Daily rate of gain	1·77	"
Amount of meal consumed	1,002	"
Value of meal	$ 9 02	
Cost of 100 lbs. gain meal alone	2 93	
Roots consumed	483	lbs.
Value of roots	0·49	
Total cost to produce pork	$ 10 51	
Cost 100 lbs. gain meal and roots	3 09	

This method of feeding had a good effect on the form of the animals making them come as near the ideal bacon type as could be desired.

PASTURING PIGS ON RIPE PEAS.

An acre of peas on the hog rotation were allowed to ripen and pigs turned out to pasture on them. The returns in pork were not satisfactory but the effect of the exercise and the pease together was wonderfully beneficial so far as form of pigs was concerned and so far as fitting them for finishing off for the packer when brought into the pens.

UTILIZATION OF FEED.

An examination into the supply of feed produced on the '200 acre Farm,' the experimental plots of roots and corn, and the meal or grain purchased for use in the barns, together with a detailed statement of the disposal thereof, and a statement of the kinds of grain and meal consumed from July 1, 1904 to June 30, 1905, follows:—

SUMMARY of Feed of all kinds used for Stock on 200 acre Farm from July 1, 1904 to June 30, 1905.

——	Straw.	Grain or Meal.	Roots and Ensilage.	Hay.
	lbs.	lbs.	lbs.	lbs.
Grown on 200 acre farm, crop of 1904	168,635	92,197	1,364,030	376,387
Received from Cereal Division	10,000	9,519	307,384	....
Received from Distribution Division (small grain)	....	8,671	....	....
Purchased	130,655	383,709	....	22,330
Total supplied during year	309,290	494,096	1,671,414	398,717
Consumed during year	294,511	435,559	1,116,123	342,471
On hand June 30, 1905	4,000	58,537	100,000	5,000

DISPOSITION of Feed harvested on, and bought for use of Live Stock on 200 Acre Farm.

——	Hay.	Grain and Meal.	Corn and Roots.	Straw.
	lbs.	lbs.	lbs.	lbs.
19 Horses	138,700	126,841	20,500	36,500
73 Steers	79,721	59,185	358,356	95,743
44 Milch cows	46,755	66,343	375,884	46,153
48 Young stock and bulls	37,702	36,554	298,981	50,921
70 Sheep	19,458	9,458	12,000	11,650
200 Swine	....	129,135	15,905	40,500
Supplied to Poultry division	....	24,792	5,827	13,044
" " Veterinary laboratory	1,535	3,551	3,670	....
Loss by experimental curing	18,600	....	25,000	....
Total accounted for	342,471	435,559	1,116,123	294,511
Amount harvested and received	398,717	494,096	1,671,414	309,290
On hand June 30, 1905	5,000	58,537	100,000	4,000
Shrinkage or loss	51,246	....	455,291	10,779

The meal consumed consisted of:—	Lbs.
Oats	171,936
Barley	19,363
Bran	96,600
Shorts	65,000
Oil meal	35,100
Various feeds	47,560
Total	435,559

LIVE STOCK INVENTORIES.

——	July 1, 1904.		June 30, 1905.				Gross Returns, made up of increase in value, value of products and value of animals sold.
	Number on hand.	Value.	Number handled during year.	Number on hand.	Value.	Returns of all descriptions.	
		$ cts.			$ cts.	$ cts.	$ cts.
Horses	19	....	... .	19	....	3,458 40	3,458 40
Shorthorns— Pure breds (17) and grades (4).	18	3,495 00	25	21	4,510 00	956 43	1,971 43
Guernseys— Pure breds (15) and grades (6).	23	2,040 00	23	21	2,530 00	898 67	1,388 67
Ayrshires— Pure breds (20) and grades (5).	28	2,560 00	29	25	2,800 00	918 66	1,158 66
Canadians— Pure breds (10) and grádes (4).	10	1,075 00	15	14	1,650 00	445 09	1,020 09
Steers	22	440 00	73	16	300 00	1,787 90	1,647 90
Sheep	66	1,020 00	70	49	1,170 00	115 08	265 08
Swine	....	2,090 00	200	117	2,255 00	1,316 07	1,481 07
Total	....	12,720 00	454	282	15,215 00	9,896 30	12,391 30

SUMMARY OF LIVE STOCK OPERATIONS.

RETURNS.

Gross returns from animals of all classes, including value of products, values of services and increase in value of young stock	$12,391 30
Manure, 1,200 tons	1,200 00
Total	$13,591 30

EXPENDITURE.

Value of Food Consumed.

Meal		$4,355 59
Hay		1,198 86
Roots and ensilage		1,116 12
Whole milk, 18,000 lbs		180 00
Skim-milk, 200,000 lbs		300 00
Straw, 147 tons at $4 per ton		588 00
Cost of labour in connection with care of horses, cattle, sheep and swine:—		
Herdsman	$ 700 00	
Two men at $450	1,080 00	
Three men at $504	1,512 00	
Extra help, teaming, &c	415 02	
	$3,707 02	
		3,707 02
		$11,445 59
Balance		2,145 71

SUMMARY OF FARMING AND LIVE STOCK OPERATIONS ON '200-ACRE FARM,' 1905.

RETURNS.

Total value of return from fields	$ 5,590 08	
Total value of returns from live stock	13.591 30	
Total returns	$19,181 38	
		$19,181 38

EXPENDITURE.

Total cost of field operations (see page 90).	$ 3,858 18	
Total cost of live stock operations (see page 74)	11,445 59	
Total expenditure	$15,303 77	$15,303 77
Balance		3,877 61

CROPS.

I have to report a fairly successful year for all kinds of crops grown. The season was peculiarly favourable for hay and pasture. It was, however, rather difficult to cure the hay properly hence the quality is not quite so good as might be desired. The kinds of hay grown this year were timothy, mixed timothy and red clover, red clover and alfalfa, red clover and orchard grass. The red clover fields and the field of alfalfa and orchard grass were cut twice. Some of the fields of red clover gave about 5½ tons per acre of cured hay in two cuttings. The pasture, a field of 14 acres, was able to carry an equivalent of 30 cows for five months. During about half that period they were being fed some green feed or ensilage as well as a small meal ration, in addition to the pasture.

The only cereal sown was oats. The variety grown was the Banner. Where soil conditions were favourable the returns were fairly good, some fields going as high as 66⅓ bushels per acre. The quality was for the most part very good. The crop of straw was rather heavy in comparison with the grain, due to the rather damp season.

On the black muck areas weeds came so thickly as to necessitate cutting certain parts while yet green. The mixture of grass, oats and weeds so cut was fed to the cattle. This of course had the effect of lowering average yield per acre as the cropless areas had to be counted in when estimating average yields per acre.

The grass, clover and alfalfa seeds sown on the different fields came up well, and did exceedingly well all summer and till late in the fall, making a fine promise for good crops of hay next year.

Corn was a very heavy crop this year. Some fields yielded an average of over 20 tons per acre, although about 20 per cent of the crop was a small growing variety, Longfellow.

The varieties grown were Longfellow, Selected Leaming, and Early Mastodon. Longfellow was almost ripe when cut about September 20, Selected Leaming was glazing or in the dough stage, and the Early Mastodon was in about the same condition. The average yield from 40 acres was about 18 tons per acre, large and small varieties all taken together. The quality of the ensilage produced is very excellent, showing a very high percentage of dry matter. One sample taken from silage made from Early Mastodon was found by Mr. Shutt, our chemist, to contain about 26 per cent of dry matter. The silage from the Selected Leaming and Longfellow is no doubt even richer in food content.

As will be seen by a glance at the reports below the cost to produce the crops was very high per acre. On account of the high yield, however, the cost per ton in the silo is comparatively low.

Mangels, sugar mangels, sugar beets, carrots, swedes, white turnips, yellow Aberdeens, kohl rabi, cabbage, 1,000 headed kale and rape were all grown in greater or lesser quantities.

On account of the wet season the cost to grow an acre of roots was very great. The yield was high, however, so the cost of roots per ton was not unusually high.

Mangels are found to be the most satisfactory root to grow on this land. Sugar mangels, while not yielding as good a crop per acre, supply a peculiarly good feed for cattle and are grown in moderate quantities for that reason. Sugar beets yielded very well this year. They are particularly valuable as feed for swine. Kohl rabi are very welcome to sheep. The 1,000 headed kale is also relished by sheep, and is probably superior to rape as a fall feed. Cabbages were fed to sheep.

COMPARATIVE Statement of Crops on '200 Acre Farm,' from 1899 to 1905, inclusive. (200 Acre Farm includes 7 Acres of Roads.)

Year.	Grain.		Hay.		Roots and Corn.		Pasture.		Soiling Crop.		Pig Pasture.		Remarks.
	Area in Acres.	Yield in Pounds.	Area in Acres.	Yield in Tons.	Area in Acres.	Yield in Tons.	Area in Acres.	Number of Cattle.	Area in Acres.	Disposition of Crops.	Area in Acres.	Crops Grown for Pasture.	
1899........	73	118,466	39	93	40	326½	40	36	1	Fed to dairy cows	....	....	Generally considered a good year for all crops.
1900........	80	126,621	53	138	40	743	20 and aftermath.	49	....	....	....	....	Season very favourable for most crops.
1901........	79	114,472	58	210	40	702	16 and aftermath.	52	....	....	....	....	" " "
1902........	74	144,914	60	216	39	665	20 and aftermath.	62	....	....	5	Clover, rape and aftermath.	Season favourable for hay, bad for corn.
1903........	69	126,619	62	154	34	473	16 and aftermath.	96	5	Dairy cows, bulls and calves.	6	Clover and rape.	Season very unfavourable for most crops, particularly adverse to corn and roots. No second crop hay.
1904........	67	112,009	60	192	46¾	674	13·75	98	3	" " ..	3	" " ..	Season unfavourable for grain and corn, good for hay and roots.
1905........	66	111,932	59	258	47	971½	14 and aftermath.	100	5	All cattle ensilage fed.	4	Clover, rape, mixed crop, pease, roots.	Season favourable for hay, corn and roots, too wet for grain on mucky land.

Of the area indicated as having been used as pasture for swine in 1905, 2 acres yielded a crop of green feed for soiling cattle before being given over to swine. Cattle were pastured on roads where possible. A small rough field not included in the '200 Acre Farm' was used as partial pasture and a run for about 20 head of young stock. These cattle received ensilage or other succulent food every day, and meal at the rate of about 1½ lbs. each per day part of the time.

The variety of crops grown and the varying areas under each crop each year make it quite difficult to make a comparison of the returns of the different years, so to simplify matters I would suggest that a fixed valuation be put upon the products, and the returns of each year valued accordingly.

Fixing prices as follows: Grain, $1 per hundred lbs.; roots and ensilage $2 per ton; hay $7 per ton; summering cattle, $8 per season; and an area used as pasture for pigs, $15 per acre; the returns from the '200-acre farm' for the years mentioned may be said to have been worth $2,776.66 in 1899; $4,110.21 in 1900; $4,434.72 in 1901; $4,787.14 in 1902; $4,148.19 in 1903; $4,741.09 in 1904; $5,714.32 in 1905.

ROTATION EXPERIMENT.

The experiment to determine the effects of different rotations is being followed up and over the detailed report of the labour on each plot, and the returns therefrom will be found some brief notes on each field and on the rotation as a whole.

The rotations are as follows:—

Rotation A.—Five years, clover hay, Timothy hay, grain, corn, grain.

Rotation B.—Five years, clover hay, grain, clover hay, corn, grain.

Rotation E.—Three years, pasture, corn, grain.

Rotation Z.—Three years, clover hay, corn, grain.

Rotation S.—Four years, shallow ploughing, clover hay, timothy hay, roots, grain.

Rotation D.—Four years, deep ploughing, clover hay, timothy hay, roots, grain.

Rotation H.—Three years, hog pasture, roots, grain or soiling crop.

Rotation T.—Four years, sheep pasture, roots and soiling crop, grain, clover hay.

Rotation M.—Six years, grain, grain, clover hay, timothy hay for three years.

Rotation N.—Six years, grain, grain, timothy hay for four years.

Rotation O.—Three years, grain, timothy hay, timothy hay.

Rotation P.—Three years, grain, clover hay, timothy hay.

In the descriptions of the rotations and fields that follow, an effort is made to give as concisely as possible the location of each field, its size, the character of its soil, its drainage and its general crop history.

In the tables will be found all items of expenditure. The manure is applied in the same ratio to each field in each rotation. To illustrate: if to the corn land in rotation 'Z,' 15 tons of manure per acre are applied; this equivalent to 5 tons per acre per annum, as Z, is a three-year rotation. Then in applying manure to M, 30 tons per acre would be applied, as M is a six-year rotation. Since the manure must vary slightly in quantity each year, $3 per annum per acre is charged in each rotation.

COMPARATIVE VALUES OF ROTATION ON STOCK FARMS.

Supposing the average animal of the bovine species to consume 2,000 lbs. hay, 1,500 lbs. meal, 16,000 lbs. roots and ensilage and 2,000 lbs. of straw per annum, which valued at prices given above would amount to $37, a rough idea of the relative value of the different rotations for stockmen may be arrived at.

ROTATION

Lot.	Location.	Description of soil.							Area in Acres.	Crop.	Crop.	Rent and Manure.	Seed, Twine and use of Machinery.
		Sand.	Sandy Loam.	Clayey Loam.	Clay.	Black Muck.	Gravel.	Hardpan.					
		p. c,	p. c.	p. c.	p. c.	p. c.	p c.	p. c.	Ac.	1904.	1905.	$ cts.	$ cts
A 1........	W.S. 3.....	30	45	....	....	25	....	....	9·96	Hay........	Oats......	59 76	16 89
A 2........	L.S. 1......	30	65	5	....	..	....	....	8·90	"	Hay.....	53 40	11 57
A 3........	A.S. 14 ...	10	15	20	20	15	....	20	10·20	Oats..........	Corn......	61 20	16 87
A 4......	W P.G.S. 1 F.S. 1......	70	20	10	....	....	....	...	9·15	"	Hay......	54 90	11 89
A 5........	F.S. 3......	....	35	30	10	15	10	....	9·63	Corn..........	Oats......	57 78	15 76
	Aggregate........................								47·84			287 04	72 98
	Average per acre in 1905..................								1			6 00	1 52

ROTATION

B 1..	W.S. 4....	5	35	5	50	5	....	....	10 00	Corn..........	Oats......	60 00	16 90
B 2,......	L.S. 2....	20	70	....	5	5	. ..	....	8 82	Hay	"	52 92	14 97
B 3...... .	A.S. 15	20	60	5	....	15	....	....	10 20	Oats...	Hay.....	61 20	13 26
B 4........	W.P.G.S. 2	20	60	15	....	5	....	...	9 15	"	"	54 90	11 89
B 5........	F.S. 2......	..	30	30	40	....	....	....	9 93	Hay	Corn......	59 58	14 73
	Aggregate								48 10			288 60	71 75
	Average per acre in 1905								1			6 00	1 49

ROTATION 'A.'

This rotation of 5 years duration includes grain, hay (2 years) grain and corn or roots in the order named. The grain crop mentioned first comes after corn. With the first crop of grain is sown 10 lbs. red clover, 1 lb. alsike and 10 lbs. timothy per acre. The field is left in hay for 2 years, then in August of the second year it is ploughed and cultivated at intervals till October, when it is ridged up and left till the next spring. Oats are sown on this field, and with them red clover seed at the rate of 10 lbs. per acre. This clover is allowed to grow for something over a year or until corn seeding time the following spring, when it is turned under with a shallow furrow along with the manure that will have been applied during the winter. After the corn has been harvested the land is ploughed shallow and left till the next spring.

The crops on this rotation this year have been fairly satisfactory. On A1 the ploughing in the fall was delayed, hence a light crop of grain. On A2 two crops of Alfalfa hay were harvested in time to permit of August ploughing. A3 gave an excellent crop of corn, and A4 a very good crop of hay. On A5 the black muck portion was injuriously affected by the weather, and no crop was harvested therefrom.

'A.'

Items of Expense in Raising Crop of 1905.								Particulars of Crop of 1905.						
Manual Labour.		Horse Labour.												
No. of hours.	Cost of Manual Labour.	No. of hours with Team.	No. of hours with Single Horse.	Value of Horse Labour.	Threshing.	Total Cost.	Cost for 1 acre.	Grain.	Straw.	Hay.	Roots and Ensilage.	Total Value.	Value of Crop per acre.	Profit per acre in 1905.
Hrs.	$ cts.	Hrs	Hrs	$ cts.	$ cts.	$ cts.	$ cts.	Lbs.	Lbs.	Lbs.	Lbs.	$ cts.	$ cts.	$ cts.
44	6 60	166¾	....	50 02	7 29	140 56	14 11	12,155	25,181	....	....	171 51	17 22	3 11
158	23 70	52	49	25 40	......	114 07	12 81	.....	.....	62,650	... .	250 60	28 16	15 35
605	90 75	339	....	101 70	......	270 52	26 52	......	... .	....	399,915	399 91	39 20	12 68
180	27 00	72	38	29 20	. ..	122 99	13 44	... ..	.....	70,628	....	247 20	27 02	13 58
87	13 05	144	10	45 20	.....	131 79	14 74	16,969	23,281	... .	....	216 25	22 45	7 71
1,074	161 10	773¾	97	251 52	7 29	779 93	16 30	29,124	48,462	133,278	399,915	1,285 47	26 86	10 56
22·44	3 36	16·17	2·02	5 25	0 15	16 30	16 30	608	971	2,785	8,359	26 86	26 86	10 56

'B.'

78	11 70	161	5	49 30	6 44	144 34	14 43	10,725	32,125	....	20,000	191 50	19 15	4 72
82	12 30	140	6	43 20	8 42	131 81	14 94	14,040	19,910	....	....	180 22	20 43	5 49
310	46 50	100	42	38 40	.....	159 36	15 62	.....	......	92,240	....	322 84	31 65	16 03
227	34 05	80	38	31 60	.....	132 44	14 47	..	......	93,682	....	327 88	35 83	21 36
760	114 00	359	....	107 70	. ...	296 01	29 81	.....	. ....	....	411,850	411 85	41 47	11 66
1,457	218 55	840	91	270 20	14 86	863 96	17 96	24,765	52,035	185,922	431,850	1,434 29	29 81	11 85
30·29	4 54	17·46	1·89	5 63	·30	17 96	17 96	515	1,081	3,865	8,978	29 81	29 81	11 85

ROTATION 'B.'

This rotation of 5 years duration includes grain, hay, corn or roots in the order named, the first crop of grain following a crop of corn or roots. Red clover 10 lbs., alsike 1 lb. and timothy 5 lbs. is sown with the grain each time grain is sown. When grain follows hay the land is ploughed in the early fall. When corn follows hay the land is ploughed in the spring, the spring growth of grass and clover being ploughed in along with the manure which will have been applied during the preceding winter.

The crops on this rotation were very fair. The crop on B1 however was very short on account of the black muck soil being very weedy. It was necessary to cut part of this field while still green so that the average was very materially lowered. B2 was similarly affected in a less degree. The corn on B5 was a remarkable crop.

ROTATION

Four year rotation, with Deep

Lot,	Location.	Description of Soil.							Area in Acres.	Crop.	Crop.		
		Sand.	Sandy loam.	Clayey loam.	Clay.	Black muck.	Gravel.	Hardpan.				Rent and Manure.	Seed and twine and use of machinery.
		p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	Ac.	1904.	1905.	$ cts.	$ cts.
D 1......	E. G. P. S. 2	20	80	....	....	....	....	....	2	Oats..........	Hay,....	12 00	1 60
D 2......	E. G. P. S. 4	20	80	....	....	....	....	....	2	Oat hay......	"	12 00	1 60
D 3........	E. G. P. S. 6	30	70	....	....	....	....	....	2	"	Roots .. .	12 00	2 60
D 4........	E. G. P. S. 8	60	40	....	....	....	....	....	2	Roots	Oats......	12 00	3 38
	Aggregate....								8	....	....	48 00	9 18
	Average per acre in 1905..............								1	....	....	6 00	1 14

ROTATON

Four year rotation, with Shallow

Lot,	Location.	Sand.	Sandy loam.	Clayey loam.	Clay.	Black muck.	Gravel.	Hardpan.	Area in Acres.	1904.	1905.	Rent and Manure.	Seed and twine and use of machinery.
S 1........	E. G. P. S. 1	20	80	....	....	....	....	....	2	Oats..........	Hay......	12 00	1 60
S 2...	E. G. P. S. 3	20	80	....	...	....	....	....	2	Oat hay......	"	12 00	1 60
S 3........	E. G. P. S. 5	30	70	....	....	....	....	....	2	"	Roots	12 00	2 60
S 4........	E. G. P. S. 7	60	40	....	....	....	....	....	2	Roots	Oats......	12 00	3 38
	Aggregate......								8	....	....	48 00	9 18
	Average per acre in 1905.....								1	....	....	6 00	1 15

ROTATION 'D.'

Deep Ploughing.

This rotation is of 4 years duration and includes grain 2 years, hay and roots.

The grain crop follows roots, the root land being ploughed to a depth of about 7 inches after the roots are harvested in the fall. With the grain is sown 10 lbs. red clover, 1 lb. alsike and 10 lbs. timothy seed per acre. The clover hay is cut twice in the season and the second aftermath left on the field, that is it is not pastured off as is usually done. In the second hay year two crops are cut if possible, and the land ploughed in August with a deep 7-inch furrow.

D1 and D2. These two plots were under hay this year. Since they had not been treated differently from S1 and S2 before being seeded down they were not cut separately.

D3. This plot, like its fellow S3, was under roots. The seed came up badly and it was necessary to resow with turnips. The cut worm then attacked the plots so that it was not considered advisable to give the actual crops in the report found below. The figures given are the average of the crops grown on both D3 and S3.

D4. This plot was under oats. The crops in this case were kept separate although there had been no difference in methods of cultivation previous to seeding to oats.

D.'

late Fall Plowing Area 8 acres.

Items of Expense in raising Crop of 1905.								Particulars of Crop of 1905.						Profit per acre in 1905.
Manual Labour.		Horse Labour.			Threshing.	Total cost.	Cost for 1 acre.	Grain.	Straw.	Hay.	Roots and ensilage.	Total value.	Value of crop per acre.	
No. of hours.	Cost of manual labour.	No. of hours with team.	No. of hours with single horse.	Value of horse labour.										
	$ cts.			$ cts.	$ cts.	$ cts.	$ cts.	Lbs.	Lbs.	Lbs.	Lbs.	$ cts.	$ cts.	$ cts.
50	7 50	16½	10½	7 05	.....	28 15	14 08	......	......	19,601	....	68 60	34 30	20 22
50	7 50	16½	10½	7 05	......	28 15	14 07	......	.. ..	19,601	....	68 60	34 30	20 22
425	63 75	50¼	28	20 67	.. ..	99 02	49 51	......	......	....	109,086	109 09	54 50	5 04
19	2 85	24½	....	7 35	2 22	27 80	13 90	3,705	5,885	....	....	48 82	24 41	10 51
544	81 60	107¾	49	42 12	2 22	183 12	91 56	3,705	5,885	39,202	109,086	295 11	147 55	55 99
68	10 20	13⅓	6⅛	5 26	0 28	22 89	22 89	463	735	4,900	13,636	36 89	36 89	14 00

'S.'

early Fall Plowing Area 8 acres.

50	7 50	16½	10½	7 05	....	28 15	14 08	.....	....	19,601	....	68 60	34 30	20 22
50	7 50	16½	10½	7 05	......	28 15	14 07	......	......	19,601	. .....	68 60	34 30	20 22
425	63 75	50¼	28	20 67	......	99 02	49 51	......	......	....	109,086	109 09	54 54	5 03
19	2 85	24½	....	7 35	2 11	27 69	13 84	3,510	6,270	....	....	47 64	23 82	10 02
544	81 60	107¾	49	42 12	2 11	183 01	91 50	3,510	6,270	39,202	109,086	293 93	146 96	55 49
68	10 20	13⅓	6⅛	5 26	0 26	22 88	22 88	439	784	4,900	13,635	36 74	36 74	13 86

ROTATION 'S.'

Shallow Ploughing.

This rotation is of 4 years duration and includes grain, 2 years hay and roots.

The grain crop follows roots, the root land being ploughed (or cultivated) to a depth of about 4 inches after the roots are harvested in the fall. With the grain is sown 10 lbs. red clover, 1 lb. alsike and 10 lbs. timothy seed per acre. The clover hay is cut twice in the season and the second aftermath left on the field, that is, it is not pastured off as is usually done. In the second hay year two crops are cut if possible and the land ploughed in August with a shallow 4-inch furrow. If manure is applied before ploughing a sub-soiler should be attached to the plough to loosen up the subsoil to a depth of 8 or 9 inches. If manure is not applied this end is attained by means of a strong deep-cutting cultivator after the sod has rotted in the fall, or next spring.

S1 and S2. These two plots were under hay this year. Since they had not been treated differently from D1 and D2 before being seeded down they were not cut separately.

S3. This plot, like its fellow D3, was under roots. The seed came up badly, and it was necessary to resow with turnips. The cut worm then attacked the plots so that it was not considered advisable to give the actual crops in the report found below. The figures given are the average of the crops grown on both S3 and D3.

S4. This plot was under oats. The crops in this case were kept separate, although there had been no difference in methods of cultivation previous to seeding to oats.

ROTATION

Lot.	Location.	Description of Soil.							Area in acres.	Crop.	Crop.	Rent and manure.	Seed, twine and use of machinery.
		Sand.	Sandy loam.	Clayey loam.	Clay.	Black muck.	Gravel.	Hardpan.					
		p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	Ac.	1904.	1905.	$ cts.	$ cts.
E 1	W.S. 1	40	40	....	....	15	5	....	14·00	....	....	84·00	23·66
E 2	L.S. 4	10	60	10	....	20	....	....	13·75	....	....	82·50	20·51
E 3	Morn.	30	60	5	....	5	....	....	14·00	....	....	84·00	25·57
	Aggregate								41·75	....	....	250 50	69·74
	Average per acre in 1905								1·00	....	....	6·00	1·67

ROTATION

Z 1	W.S. 2	40	40	....	....	15	5	....	6·00	....	....	36·00	10·14
Z 2	L.S. 3	10	60	10	....	20	....	....	5·81	....	....	34·86	8·73
Z 3	Obs. S.	10	60	20	10	....	....	....	5·50	....	....	40·00	7·15
	Aggregate								17·31	....	....	110·86	26·02
	Average per acre in 1905								1·00	....	....	6·00	1·50

ROTATION 'E.'

This rotation of three years' duration includes grain, pasture and corn.

The grain comes after the corn, the stubble of which is treated as described under rotation 'A.' With the grain in the spring is sown 10 lbs. red clover, 1 lb. alsike clover, 5 lbs. alfalfa and 5 lbs. timothy seed per acre. If weather permits the field is pastured slightly in the fall.

After the grain crop the land is pastured, the grass seeding having been done with this object in view. In estimating the value of the returns from this field, pasture is charged at $1 per month per cow. At this rate the returns fall very far short of what would have been the returns if a hay crop had been harvested, if we may judge by the returns from 'Z 2.' This rotation and rotation Z were introduced into the list in order to gain some idea as to the difference in returns probable from land pastured and land from which all the crops are harvested. Of course the corn crop after the pasture has in a measure made up for the difference in favour of the no pasture rotation 'Z,' but the returns are on the whole still considerably short of those from 'Z.'

Corn follows the pasture. Manure is applied during the fall and winter and turned under with the growth of clover grass in the spring.

'E.'

Items of Expenses in Raising Crop in 1905.								Particulars of Crop in 1905.						
Mannal Labour.		Horse Labour.												
No. of hours.	Cost of manual labour.	No. of hours with team.	No. of hours with single horse.	Value of horse labour.	Threshing.	Total cost.	Cost for 1 acre.	Grain.	Straw.	Hay.	Roots and ensilage.	Total value.	Value of crop per acre.	Profit per acre in 1905.
Hrs.	$ cts.	Hrs.	Hrs	$ cts.	$ cts.	$ cts.	$ cts.	Lbs.	Lbs.	Lbs.	Lbs.	$ cts.	$ cts.	$ cts.
135	20 25	200	12	62 40	18 96	209 27	14 94	31,580	36,770	....	....	399 34	28 52	13 58
843	126 45	452	20	139 60	......	369 06	26 84	......	......	....	530,340	530 34	38 57	11 73
.....	......	.....	....	.....	.....	109 57	7 83	... .	....	*162 m.	....	162 00	11 57	3 74
978	146 70	652	32	202 00	18 96	687 90	.....	31,580	36,770	162	530,340	1,091 68	....	....
23 42	3 51	15·61	76	4 83	0 45	16 47	16 47	756	880	3·88	12,678	26 14	26 14	9 67

'Z.'

60	9 00	71	4	22 10	5 07	82 31	12 05	8,450	14,930	....	....	115 36	19 23	7 18
325	48 75	181	15	57 30	......	149 64	25 75	......	.....	....	195,850	195 85	33 71	7 96
96	14 40	55	36	23 70	. ....	85 25	15 50	......	......	59,260	....	207 41	37 71	24 63
481	72 15	307	55	103 10	5 07	317 10	18 31	8,450	14,930	59,260	195,850	518 62	29 96	———
27.78	4 17	17·73	3·17	5 95	0 29	18 31	18 31	488·15	862·56	423·14	11314·21	29 96	29 96	11 65

ROTATION 'Z.'

This rotation of three years' duration includes corn, grain and clover hay, in the order named.

Corn comes after the clover hay. The manure is applied in the fall or during the winter and spring, and the clover allowed to grow up through it, so facilitating the turning under of the whole mass of manure and spring growth and late fall growth of clover a few days before the corn is to be sown. The furrow turned is quite shallow, about 5 inches deep, and the land is then thoroughly disc-harrowed and the corn sown in rows 42 inches apart. It receives later the usual cultivation and care.

Grain follows corn, the land having been ploughed in the fall. With the grain there is sown 10 lbs. red clover, 1 lbs. alsike and 5 lbs. timothy seed. The hay is cut twice and the last aftermath allowed to grow up to be turned under the next spring for corn. Such a rotation would be particularly valuable to a farmer having sufficient rough land for pasture or for one desirous of keeping as many cattle as possible on the land at his disposal, supposing him willing to grow roots and corn.

ROTATION

Lot.	Location.	Description of Soil.							Area in Acres.	Crop.	Crop.		
		Sand.	Sandy Loam.	Clayey Loam.	Clay.	Black Muck.	Gravel.	Hardpan.				Rent and Manure.	Seed, Twine and use of Machinery.
		p.c.	p.c.	p.c.	p.c.	p.c.	p.c.	p.c.	Ac.	1904.	1905.	$ cts.	$ cts.
H 1	H.S. 1	30	40	20	10	....	....	....	3·35	Pasture	Roots	20 10	5 50
H 2	H.S. 2	25	45	20	10	....	....	....	3·15	Roots	Grain	18 90	5 64
H 3	H.S. 3	10	20	50	20	....	....	....	2·85	Pasture and soiling crop	Pasture and soiling crop	17 10	2 60
	Aggregate								9·35	....	....	56 10	13 74
	Average per acre in 1905								1	....	....	6 00	1 47

ROTATION

T 1	S.S. 1	10	90	....	....	....	....	..	1·51	Roots	Grain	9 06	2 45
T 2	S.S. 2	15	85	....	....	....	....	....	2·44	Rape	Roots	14 64	2 73
T 3	S.S. 3	....	100	....	....	....	....	....	3·27	Soiling	Pasture	19 62	2 48
T 4	S.S. 4	15	85	....	....	....	....	....	3·50	Pasture	Pasture	21 00	... .
	Aggregate								10·72	....	....	64 32	7 66
	Average per acre in 1905								.....	....	....	6 00	0 71

ROTATION 'H.'

Hog Farm.

This rotation is of three years' duration and includes roots, soiling crop and pasture in the order named. The land is ploughed late in the fall after it has been manured. It is disked the next spring and the roots sown on ridges. The roots receive the usual cultivation and are of a varied character, including mangels, sugar mangels, sugar beets and turnips devoted to pork production for the most part, the surplus being sold to cattle and the returns invested in meal for pig feeding.

The soiling crop field is sown with various crops suitable for feeding to pigs. What is over and above the amount possible of consumption by pigs is sold to cattle at $2 per ton and the returns used to purchase meal for pork production.

The pasture area is divided into several parts, the seed being sown as far as possible at the same time as the soiling crops the previous year, and not allowed to be eaten too close the first fall, although any good growth is not wasted.

H. 1. This field was this year under roots, turnips, carrots, mangels, sugar beets and sugar mangels. Part of the plot is pastured off with pigs. They had access to all the above sorts of roots, but seemed to prefer mangels and sugar beets.

H. 2. This plot was in grain soiling crop and peas for pasturing off when ripe.

H. 3. This plot was used for pasture after cutting crops of alfalfa and peas and oats for soiling cows.

'H.'

Items of Expense in Raising Crop of 1905.								Particulars of Crop of 1905.						
Manual Labour.		Horse Labour.												
No. of Hours.	Cost of Manual Labour.	No. of hours with Team.	No. of hours with single Horse.	Value of Horse Labour.	Threshing.	Total Cost.	Cost for one Acre.	Grain.	Straw.	Hay.	Roots and Ensilage.	Total Value.	Value of Crops per Acre.	Profit per Acre in 1905.
Hrs.	$ cts.	Hrs	Hrs	$ cts.	$ cts.	$ cts.	$ cts.	Lbs.	Lbs.	Lbs.	Lbs.	$ cts.	$ cts.	$ cts.
891	133 65	83	63	37 50	......	196 75	58 73	......	.....	....	186,532	249 36	74 43	15 70
24	3 60	63	1	19 10	2 07	49 31	15 65	3,448	6,332	....	....	79 64	25 28	9 63
6	0 90	23½	....	7 05	1 00	28 65	10 05	794	2,000	....	12,085	33 02	11 58	1 53
921	138 15	169½	64	63 65	3 07	274 71	.....	4,242	8,332	....	198,617	362 02	38 70	9 32
98½	14 78	18·1	6·8	6 81	0 33	29 38	29 38	454	891	......	212·42	38 70	38 70	9 32

'T.'

8	1 20	19	1	5 90	.....	18 61	12 25	......	......	9,000	10,300	22 20	14 70	1 75
385	57 75	64	29	25 00	......	100 12	41 03	..	......	....	139,245	139 25	57 07	16 04
3	0 45	13	3	4 50	......	27 05	8 27	.....	.....	4,000	....	47 41	14 50	6 23
2	0 30	9	1	2 90	......	24 20	6 90	......	......	....	....	24 20	6 90	......
398	59 70	105	34	38 30	......	169 98	......	... ..	......	13,000	149,545	233 06	21 74	5 89
37⅕	5 58	9⅘	3⅙	3 57	......	15 85	15 85	......	......	1,212	13,950	21 74	21 74	5 89

ROTATION 'T.'

Sheep Farm.

This rotation of four years duration includes roots, grain, hay and pasture.

The area devoted to sheep farming is rather limited, about 10·72 acres. This area is not included in the '200-acre farm.' The whole field had been for several years devoted to pasturing sheep, but it has been divided into four rather unequal fields susceptible of further subdivision and devoted to a rotation considered suitable for sheep.

The root field is devoted to white turnips, Swedes, cabbage, Kohl Rabi, thousand headed kale, rape, &c. It comes after the pasture, the land being manured and ploughed in the fall.

Grain follows the root land, and with the grain various clovers and grass seeds are sown to prepare for the ensuing two years. The grain may be harvested or used as soiling crop for sheep. The hay field is expected to give one crop of hay and then be devoted to pasture for lambs as soon as they are weaned.

The pasture field is the field that has been hay the previous year. Alfalfa, red clover, alsike clover, *Bromus inermis* and timothy are the clovers and grasses used.

The crops on this rotation were fairly satisfactory this year.

ROTATION

This rotation of six years' duration

Lot.	Location.	Description of Soil.							Area in acres.	Crop.	Crop.		
		Sand.	Sandy loam.	Clayey loam.	Clay.	Black muck.	Gravel.	Hardpan.				Rent and manure.	Seed, twine and use of machinery.
		p.c.	p.c.	p.c.	p.c.	p.c.	p.c.	p.c.	Ac.	1904.	1905.	$ cts.	$ cts.
M 1.......	A.S. 2.....	....	30	15	....	45	....	10	1	Oats......	Oats..........	6 00	2 60
M 2.....	A.S. 4.....	....	30	15	....	45	....	10	1	Oat hay ..	Clover hay....	6 00	0 80
M 3.......	A.S. 6.....	....	30	15	....	45	....	10	1	" ..	"	6 00	0 80
	Aggregate..........................								3			18 00	4 20
	Average per acre in 1905................								1			6 00	1 40

ROTATION

This rotation of six years' duration includes no clover in the hay save

N 1........	A.S. 3.....	....	30	15	....	45	....	10	1	Oats......	Oats..........	6 00	1 60
N 2........	A.S. 5.....	....	30	15	....	45	....	10	1	Oat hay..	Timothy hay..	6 00	0 45
N 3........	A.S. 7 ...	....	30	15	....	45	....	10	1	" ..	" ..	6 00	0 45
	Aggregate..............................								3			18 00	2 50
	Average per acre 1905..............								1			6 00	0 89

ROTATION 'M.'

This rotation of six years duration includes in its crops grain, grain, clover hay and then timothy hay or mixed hay for three years. First year grain is sown on sod ploughed late in the fall. In the spring the land is disked, harrowed and sown with 10-pound of red clover seed per acre at the same time as the grain is sown. After the grain is harvested the clover is allowed to grow as late as possible and the land ploughed the last thing in the fall. The next spring 8 pounds of red clover and 10 pounds timothy seed is sown with the grain and the land put in as good shape as possible.

Clover hay follows the second year grain. It is cut twice in the year and the last aftermath not pastured.

Timothy hay or mixed hay then occupies the land for three consecutive years. Manure is applied in the fall of the second year that the field is under hay.

M 1. This field was sown to oats May 1 and cut August 11. It includes a very considerable area of black mucky soil which on account of the season became infested with weeds and the crop had to be cut and fed green to cattle. In giving the returns for this field this fact was borne in mind and allowance made.

M. 2. This field was under clover hay.

M. 3. This field was the one in the rotation that received manure in the fall of 1904.

'M.'

includes clover in the hay. Area 3 acres.

Items of Expense in Raising Crop of 1905.								Particulars of Crop of 1905.						
Manual Labour.		Horse Labour.												
No. of Hours.	Cost of manual labour	No. of hours with team.	No. of hours with horse.	Value of horse labour	Threshing.	Total cost.	Cost for 1 acre.	Grain.	Straw.	Hay.	Roots and ensilage.	Total value.	Value of crop per acre.	Profit per acre in 1905.
Hrs.	$ cts.	Hrs	Hrs	$ cts.	$ cts.	$ cts.	$ cts.	Lbs.	Lbs.	Lbs.	Lbs.	$ cts.	$ cts.	$ cts.
6	0 90	16¾	....	5 02	1 10	15 62	15 62	18 20	36 10	....	....	25 42	25 42	9 80
18½	2 77	11	4	4 10	......	13 67	13 67	... .	....	8,830	....	30 84	30 84	17 17
18½	2 77	11	4	4 10	. ...	13 67	13 67	... .	......	10,950	....	38 32	38 32	24 65
43	6 44	38¾	8	13 22	1 10	42 96	42 96	18 20	36 10	19,780	....	94 58	94 58	51 62
14	2 15	13	3	4 41	0 37	14 32	14 32	6 07	12 03	6,593	....	31 53	31 53	17 21

'N.'

such as may happen to get in from unknown sources. Area 3 acres.

6	0 90	16¾	½	5 12	0 95	13 57	13 57	15 60	31 90	....	....	21 98	21 98	8 41
10	1 50	6	2	2 20	......	10 15	10 15	... ..	... ..	4,830	....	19 32	19 32	9 17
10	1 50	5½	2	2 05	.....	10 00	10 00	......	......	6,200	....	24 40	24 40	14 40
26	3 90	28¼	4½	9 37	0 95	33 72	33 72	15 60	31 90	11,030	....	65 70	65 70	31 98
9	1 30	9⅓	....	3 12	0 32	11 24	11 24	5 20	10 63	3,676	....	21 90	21 90	10 66

ROTATION 'N.'

This rotation of six years' duration includes in its crop grain, grain and timothy hay for four years.

The first year's grain is sown on land that had been ploughed six inches deep the fall previous. No grass or clover seed of any kind is sown with it. The stubble is ploughed in the fall and with the grain of the second year timothy seed is sown at the rate of 12 pounds per acre. Every care is taken to insure a good catch and the land put in as good shape as possible to remain in meadow four years.

Timothy hay is then the crop for four years, manure being applied in the fall of the second year of hay.

N 1. This field was sown to oats May 1 and cut Aug. 11. It includes a very considerable area of black mucky soil which on account of the season became infested with weeds, and the crop had to be cut and feed green to cattle. In giving the returns for this field below this fact was borne in mind and allowance made.

N. 2. This field was under timothy hay.

N. 3. This field was the one in the rotation that received manure in the fall of 1904.

ROTATION

This rotation of three years duration has no

Lot.	Location.	Description of Soil.							Area in acres.	Crop.	Crop.		
		Sand.	Sandy loam.	Clayey loam.	Clay.	Black muck.	Gravel.	Hardpan.				Rent and manure.	Seed, twine and use of machinery.
		p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	Ac.	1904.	1905.	$ cts.	$ cts.
O 1........	A. S. 8......	....	30	15	....	45	....	10	1	Oat hay	Hay......	6 00	0 60
O 2........	A. S. 10......	....	30	15	....	45	....	10	1	"	Oats......	6 00	2 30
O 3........	A. S. 12......	....	30	15	....	45	....	10	1	Oats..........	Hay......	6 00	1 30
	Aggregate.								3	....	....	18 00	4 20
	Average per acre in 1905......								1	....	....	6 00	1 40

ROTATION

This rotation of three years duration

Lot.	Location.	Sand.	Sandy loam.	Clayey loam.	Clay.	Black muck.	Gravel.	Hardpan.	Area in acres.	Crop. 1904.	Crop. 1905.	Rent and manure.	Seed, twine and use of machinery.
P 1........	A. S. 9......	....	30	15	....	45	....	10	1	Oat hay	Hay......	6 00	1 30
P 2........	A. S. 11......	....	30	15	....	45	....	10	1	"	Oats......	6 00	1 30
P 3... ...	A. S. 13......	....	30	15	....	45	....	10	1	Oats..........	Hay......	6 00	0 60
	Aggregate....								3	....	....	18 00	3 20
	Average per acre in 1905................								1	....	....	6 00	1 07

ROTATION 'O.'

This rotation is three years' duration and includes grain, timothy hay, timothy hay.

The field intended for grain is ploughed early in the fall and cultivated at intervals to insure the sod rotting. It is ploughed again late in the fall and with the grain, the next spring, timothy seed is sown at the rate of 12 lbs. to the acre.

Timothy hay is cut for two years and the land again ploughed early in the fall. Manure is applied in the fall of the first year under hay.

O 1. This field was under timothy hay.

O 2. This field was sown to oats May 1, cut August 11. It includes a very considerable proportion of black mucky soil which, on account of the season, became infested with weeds and the crop on that part had to be cut and fed green to cattle. In giving the returns for this field below this fact was borne in mind and allowance made.

O 3. This field was under timothy hay and was the field to receive manure in the fall of 1904.

‘O.’

clover included in its crops. Area 3 acres.

Items of Expense in raising Crop of 1905.								Particulars of Crop of 1905.						
Manual Labour.		Horse Labour.												
No. of hours.	Cost of manual labour.	No. of hours with team.	No. of hours with single horse.	Value of horse labour.	Threshing.	Total cost.	Cost for 1 acre.	Grain.	Straw.	Hay.	Roots and ensilage.	Total value.	Value of crop per acre.	Profit per acre in 1905.
Hrs.	$ cts.	Hrs	Hrs	$ cts.	$ cts.	$ cts.	$ cts.	Lbs.	Lbs.	Lbs.	Lbs.	$ cts.	$ cts.	$ cts.
10	1 50	5½	2	2 05		10 15	10 15	......	......	4,290	....	16 58	16 58	6 43
6	0 90	16½	½	5 05	1 02	15 27	15 27	1,690	3,280	....	....	23 46	23 46	8 19
10	1 50	5½	2	2 05	......	10 85	10 85	......	......	5,000	....	20 00	20 00	9 15
26	3 90	27½	4½	9 15	1 02	36 27	36 27	1,690	3,280	9,290	....	60 04	60 04	23 77
8⅔	1 30	9⅙	1½	3 05	0 34	12 09	12 09	563	1,093	3,097	....	20 01	20 01	7 92

‘P.’

includes clover. Area 3 acres.

18½	2 77½	10½	4	3 95	......	14 02	14 02	......	......	8,210	....	28 73	28 73	14 71
6	0 90	16½	½	5 05	0 90	14 15	14 15	1,494	3,256	....	....	21 45	21 45	7 30
18½	2 77½	10½	4	3 95	......	13 33	13 32	......	......	10,990	....	38 46	38 46	25 14
43	6 45	37½	8½	12 95	0 90	41 50	13 83	1,494	3,256	19,200	....	88 64	88 64	15 72
14⅓	2 15	12½	2⅚	4 32	0 30	13 83	13 83	498	1,085	6,400	....	29 55	29 55	15 72

ROTATION ‘P.’

This rotation is of three year’s duration and includes grain, clover hay, and timothy hay or mixed hay.

The field intended for grain is ploughed early the previous fall and cultivated at intervals to insure the sod rotting. It is again ploughed late in the fall and left till seed time next spring. With the grain is sown ten pounds clover and ten pounds timothy.

Manure is applied in the fall of the first year of hay.

P 1. This field was under clover hay.

P 2. This field was sown to oats May 1, cut August 11.

It includes a very considerable proportion of black mucky soil which on account of the peculiar weather became infested with weeds, and the crop on that part had to be cut and fed green to cattle.

In giving the returns for this field below this fact was borne in mind and allowance made.

P 3. This field was under clover hay and was the field to receive manure in the fall of 1904.

SUMMARY OF OPERATIONS ON '200 ACRE FARM.'

Returns as per statements, pages 73 to 89 inculsive		$ 5,590 08
EXPENDITURES.		
Rent, labour and manure as per statements on pages 73 to 89 inclusive	$ 3,444 18	
Extra manure (not included in statements mentioned above but produced by live stock on experimental farm and applied to '200 Acre Farm')	414 00	
Total expenditure	$ 3,858 18	
		$ 3,858 18
Balance		$ 1,731 90

REPORT OF THE HORTICULTURIST

(W. T. MACOUN.)

December 1, 1905.

Dr. Wm. SAUNDERS, C.M.G.,
Director, Dominion Experimental Farms,
Ottawa.

SIR,—I have the honour to submit herewith the nineteenth annual report of this division. The results of some of the most important experiments conducted during the year and information regarding other work of the horticultural division will be found in this report.

CHARACTER OF SEASON.

The winter of 1904-5 while not a very severe one, was marked by long spells of cold weather, but as there was a good depth of snow no special injury was done. Winter set in on November 24, 1904, with snow and frost. The snow gradually increased in depth, but was reduced a little on December 31, when the temperature rose to 35·7°F. This, however, was the only day in December when the temperature rose above freezing, it being a cold month. The coldest day of the month and the coldest of the winter was Christmas day, when the temperature went down to 20·6°F. below zero. January was a moderately cold month. While the temperature rose above freezing it was only for a few hours, and there was no real thaw during the month. The lowest temperature was 20°F. below zero on January 14. The heaviest snowstorm in many years occurred on January 6 and 7, the high wind causing the snow to drift badly. This was followed by another heavy storm on the 10th. By the middle of the month there were about three feet on the level, affording excellent protection for the roots of trees and for low growing plants. February was a cold month, the temperature not once rising above freezing. The lowest temperature was 18·7°F. below zero on the 16th. The weather continued cold up to March 18, the temperature falling to 16°F. below zero on the 14th, a low temperature for March. On the 18th there was heavy rain and the snow may be said to have begun to go on that date. There were about three feet on the level when it began to melt, but there was an almost continuous thaw until April, and by April 1, while there were still patches of snow on the ground, about half the surface of the soil was bare. Owing to the snow coming in November and remaining, there was very little frost in the ground during the winter, hence the soil could be worked soon after the snow disappeared. The first ploughing was done in the orchard on April 15, but spades were used on the 13th. There was very little rain in April and owing to the comparatively cool weather through most of the month it was very favourable for planting. The highest temperature was on the 28th, when it rose to 75°F. The last spring frost recorded was on May 2, when the temperature was 29·5°F., although light local frosts were noticed in this locality later in the month. The weather in May was alternately warm and cool. The highest temperature during the month was 78·8°F. on the 25th. At the end of May the vegetation was from a week to ten days later than the average. Vegetation was showing the need of rain badly at the beginning of June, but on the 2nd there was a fine rain. There was a light frost in low places on June 3. On June 10 the season was considered still ten days later than the average. From June 12 until July 19, the weather was almost constantly warm. For ten days in June and for sixteen days in July the temperature was 80°F. and above. The highest recorded in June being 86·5°F. on the 20th, and the highest in July 91·4°F. on the 18th. While the weather became a little cooler on July 20, it continued warm until August 12. As there was plenty of rain during this long spell of warm weather growth was rapid. The latter part of August was moderately warm and bright. The highest temperature was 86·6°F. on the 10th. September was moderately warm and with occasional showers up to the 23rd, when it became cool and remained so to near the end of the month. The highest temperature was 80·2°F. on the 10th, and the nearest approach to frost recorded was on September 26, when it fell to 32·2°F. There was, however, a light frost on September 13th, not recorded by the thermometer, which killed cucumbers and melons and in places touched tobacco, although the injury to the latter was not great. On September 26, tomatoes and other tender things were killed. October was a fine month. The first ten days were moderately warm, the temperature rising to 76°F. on the 1st, and the rest of the month varied from cool to moderately warm. The night temperatures were rather low, both in September and October, though no frost was recorded until October 7, when the temperature fell to 29·5°F. The first severe frost was on the 22nd, when the temperature was 22·8°F., and after that date there were several frosts, the lowest occurring on the 30th, when it was 16·5°F. November was cool and frosty. On the 6th there was a fall of 2½ inches of snow, and on the 8th, 2 inches more. This melted slowly, and was practically gone on November 13, when the temperature dropped to 16·8°F., and to 10°F. on the 14th, stopping ploughing. The ground remained frozen, preventing ploughing, until November 24, when there was little frost left in the ground. There was heavy rain on November 26, and on the 27th the ground froze again and winter may be said to have set in on that date.

FRUIT AND VEGETABLE CROPS.

There was a good supply of fruit and vegetables in the provinces of Ontario and Quebec this year, although the apple crop was below the average in most sections of Ontario, and hence there was not as much fruit exported as last year. The light crop of apples this year was no doubt in a measure due to the severe winter of 1903-4, which weakened many trees. This was followed by a bountiful harvest in 1904, which probably further weakened the trees, which were not able to support another good crop this year. In the Ottawa Valley, where the crop was very good, bearing trees were for the most part of hardy varieties, which were uninjured by the winter of 1903-4, the tenderer kinds having been killed outright. Summer and autumn varieties sold at low prices, but winter fruit, for which there was a strong demand, brought very remunerative returns.

The peach, pear, plum, and cherry crops were all good. The cherry rot and ripe rot on the plums, however, caused considerable loss. The grape crop was good and the black rot not nearly so bad as last year. The crops of all bush and small fruits were good. Tomatoes were not so plentiful as last year, owing to the cool spring, but prices were better. Other vegetables were abundant, with the exception of potatoes, which were much injured by blight and rot in most sections, except where sprayed with Bordeaux mixture.

At the Central Experimental Farm the apple crop was good and the fruit practically uninjured by either codling moth or black spot. There was a light crop of Russian pears and cherries, but the crop of Americana and Nigra plums was good; some of the Domestica varieties also fruited this year. The grape crop was very good, but owing to the comparatively cool autumn the fruit did not ripen as thoroughly as in some years, although 90 varieties matured sufficiently to be called ripe. The crops of raspberries, currants and gooseberries were all good. Strawberries bore a medium crop. Most vegetables did well, but the season was too cool and showery for melons, which were practically a failure, and tomatoes did not yield as much ripe fruit as in drier and warmer seasons. Leaf blight affected the cabbage and cauliflower to a considerable extent, preventing them from developing as well as usual. The potato crop was good where the vines were well sprayed with Bordeaux mixture, but unsprayed plots suffered badly from blight and the crop was much reduced.

MEETINGS ATTENDED AND PLACES VISITED.

During the year the following meetings were attended and addresses given where intimated:—

Quebec Pomological Society, Ayer's Cliff, P.Q., December 14 and 15, 1904: 'Potato Culture.'

Prince Edward Island Fruit Growers' Association, Charlottetown, P.E.I., December 20, 21, 1904: 'Guides to Success in Fruit Culture,' 'Strawberry Culture.'

Society for Horticultural Science, Philadelphia, December 27-28: 'The Horse Bean as a Cover Crop.'

Vermont State Fruit Growers' Association, Vergennes, Vt., February 9-10, 1905. 'The Cherry.' 'The Strawberry.'

Niagara Fruit Growers' Association, meetings at Jordan Station, Queenston and St. Catharines, March 16, 17, 18, 1905. 'Diseases of the Grape' and 'Strawberries.'

Ontario Agricultural Department, Demonstrations in Spraying, St. Catharines and Virgil, April 18-19, 1905.

'Demonstration of Making Kerosene Emulsion with Flour.'

Quebec Pomological Society, St. Hilaire, P.Q., August 23-24, 1905. 'Report on Fruit Exhibits.'

Toronto Exhibition, September 12, 1905. Examination of Fruit Exhibits.

Ontario Fruit Growers' Association.

Ontario Vegetable Growers' Association.

Ontario Horticultural Association, Toronto, November 14, 15, 16, 17, 18, 1905. 'Report on New Fruits,' 'Fruit Growing in Great Britain and Ireland,' 'The Botanic Garden of the Central Experimental Farm,' 'The Best Varieties of Vegetables.'

While in Great Britain and Ireland during the summer of 1905, I visited many places of interest and the information obtained should prove of considerable value in connection with the horticultural work here. Among the places visited may be mentioned the Department of Agriculture, Dublin, Ireland, and the Government Farm and Botanic Gardens at Glasnevin, Ireland; the Daisy Hill Nurseries, Newry, Ireland; the Fruit Districts of Armagh county, Loughgall and Anaghmore, Ireland, being others of principal points visited. Dickson's Nurseries at Belfast were also examined. While in England a visit was paid to the Royal Gardens, Kew ; the Horticultural College, Swanley, Kent; the Horticultural College, Reading; Sutton's Trial Grounds, Reading, and the Woburn Fruit Experiment Station, Ridgemont, at all of which places many interesting things were seen.

ACKNOWLEDGMENTS.

It is again a pleasure to acknowledge the services of Mr. J. F. Watson and Mr. H. Holz, who in the performance of their various duties have done much to make the work of the division successful. The faithful work of Mr. F. Horn, foreman in the Arboretum and Botanic Garden, is acknowledged.

The information furnished by many fruit growers in Canada and the United States has been much apreciated, as in order to make the experimental work here of the greatest value it should be supplemented by the experience of others.

DONATIONS.

Each year there are many valuable donations of plants, scions, seeds, etc., and in the following list will be found an acknowledgment of those that were received during the past year.

Donations.	Sender.
New Jersey Experiment Station, New Brunswick, N.J., U.S.	Seeds of corn, tomatoes, peppers, and egg plants.
James Miller, Lyn, Ont.	One Miller Hand marker.
J. F. Wagner, Bennett, Iowa, U.S.	Scions of 194, 197 and 199 Seedling plums.
Wm. A. Anderson, West Union, Iowa, U.S.	Scions of Anderson plum.
Ohio Experiment Station, Wooster, Ohio, U.S.	Apple scions—15 varieties.
L. Cameron, Iroquois, Ont.	Scions of Seedless apple, McIntosh Sweet and Fall Greening.
Ontario Agricultural College, Guelph, Ont.	Pearl of Savoy, Empire State and American Wonder potatoes.
P. Carstesen, Billings' Bridge, Ont.	Scions of early native plum.
C. L. Stephens, Orillia, Ont.	Scions of Northern Spy and King apples.
Trappist Fathers, Oka, Que.	Scions of American Golden Russet apple.
Botanic Garden, Upsala, Sweden.	Collection of seeds.
T. Rowan, Macgregor, Man.	Wee Macgregor potato.
John McCarty, Semiwagan Ridge, N.B.	Scions of No. 1 and No. 2 and Esson seedling apples.
Dr. A. Harkness, Lancaster, Ont.	Apple scions.
J. P. Cockburn, Gravenhurst, Ont.	Scions of Rakestrow apple and Gopon plum.
W. H. Dempsey, Trenton, Ont.	Apple scions.
E. Kenny, St. Vincent de Paul, Que.	Scions of seedling apple.
D. E. Bloomfield, Scotland, Ont.	Scions of unknown apple.
W. L. Rowell, Ayers' Cliff, Que.	Scions of Lincoln apple.
C. R. Dickie, Muddy Creek, P.E.I.	Velvet beans.
Miss P. L. Baker, Oakville, Ont.	Scions of seedling apple.
The Templin Co., Calla, Ohio, U.S.	3 plants Cardinal strawberry.
Amherst Agricultural College, Amherst, Mass., U.S.	Scions of Palmer Greening apple.
A. C. Sharpley, Arizona, Man.	Northern Star, Sir John Llewellyn and Duke of York potatoes.
W. L. Scott, Ottawa, Ont.	Scions of unknown apple.
Thos. Bousfield, Carlisle, Ont.	Snider Best Early potato
W. A. Smith, Roblin, Man.	Sutton's Sion House potato.
Vermont Experiment Station, Burlington, Vt., U.S.	Rust-proof, June and Sutton's Discovery potatoes.
Henry E. Wright, Summerside, P.E.I.	2 trees Abegweit plum.
H. G. Schmidt, Cross Lake, Ont.	Four varieties of beans.
J. F. Litooy, Everett, Wash., U.S.	Plants of Mammoth and Himalaya Blackberries and Phenomenal raspberry.
A. M. Smith, St. Catharines, Ont.	Plants of two seedling strawberries.
C. Draffin, Merivale, Ont.	Fantail Rose and Early Pride potatoes.
Chas. H. Smith, Sand Beach, Yarmouth, N.S.	Plants of seedling strawberry.
Thos. C. Paddon, Toronto, Ont.	Scions of seedling plum.
Dr. Mackay, Halifax, N.S.	Plants of Heather.
Hon. F. R. Latchford, Ottawa, Ont.	Buds of Latchford plum.
W. J. Malden, Surbiton, England	Malden's Recorder potato.
L. A. Sovereign, Round Plains, Man.	Potatoes.
John Scott, ———	Recorder, Duches of Cornwall, and Eldorado potatoes.
———, Oshawa, Ont.	Hard to Beat potato.
Isaac Lindsay, Sawyerville, Que.	Canadian Red potato.
Charles Scott, Melville Cross, Ont.	Magyar potato.
J. M. Macoun, Ottawa, Ont.	Seeds of *Lilium Philadelphieum* from wet ground.
J. W. Johnston, Campbellford, Ont.	Scions of seedling plum.
Miss Maggie McLaurin, Dalkeith, Ont.	Scions of Craignaivie apple.

THE TESTING AND THE ORIGINATION OF NEW FRUITS AT THE CENTRAL EXPERIMENTAL FARM.

There is a large collection of promising new fruits at the Central Experimental Farm, the result of eighteen years' work in gathering together the varieties advertised by nurserymen and the best seedlings not yet offered for sale. Many seedlings have also been raised from the best varieties which have fruited at Ottawa, and many others from seed imported from Russia. Work in cross-breeding has also been carried on, and varieties originated in this way are now beginning to fruit. If a man sends a seedling fruit for examination and it is considered promising, scions are asked for and if received are propagated and later on the young trees are planted in the orchard. At the present time there are over 100 such promising seedlings of apples alone which are being tested in this way. The results of these experiments take time, and it has always been the policy of the Horticulturist to thoroughly test a variety before recommending it for general planting. For this reason, there have been comparatively few additional kinds added in recent years to the list of those recommended. When we are convinced, however, that a variety is a decided acquisition, the planting of it is strongly recommended. The McIntosh Red apple is an example of this. The information furnished regarding this fine variety has undoubtedly done much to extend the planting of it during recent years.

Nearly 2.000 seedlings of McIntosh Red, Fameuse, Swayzie Pomme Grise, Lawver, Northern Spy, Winter St. Lawrence, Wealthy, Salome and other varieties are under test. This year 37 of these fruited. Few of them were promising, but the majority of them were apples of good size and fair quality. An orchard of 3,000 trees of seedling apples from seed imported from Russia has, after testing the fruit, been reduced to 75 trees, which have borne the best fruit, the rest having been destroyed. While but few of these will prove of value in the warmer parts of Ontario and Quebec, a greater number may be found valuable for the North. In a few years the crosses made with McIntosh Red, Lawver, Northern Spy, Milwaukee and North Western Greening will begin to fruit and from these something good should be obtained. There are also seedling plums, currants, raspberries, grapes and strawberries in the Horticultural Department, of which there are some that we are confident will yet find a place among commercial varieties. Descriptions of the most promising varieties originated and tested at the Central Experimental Farm have appeared from time to time in the annual reports.

SEEDLING FRUITS RECEIVED FOR EXAMINATION—1905.

The following seedling varieties were received for examination this year. Full descriptions are published of those considered promising, and only a partial description of those of less merit. These descriptions are valuable because they constitute a record of all the promising seedling fruits which come under our notice. If any of these varieties should in future years be grown in the commercial nurseries of Canada their history can be traced and the description given by the nurseryman compared with the original description published in these reports. These descriptions not only serve as a record, but they bring these varieties and their characteristics under the notice of many fruit growers who, if they desire, can test the more promising ones themselves, providing of course, that scions can be obtained.

Fruit growers are asked to continue to send in specimens of promising varieties, as in this way those of exceptional merit will find recognition.

Record.	Province.	Name and Address of Sender.	Description of Fruit.
316	Nova Scotia.	E. Zwickers, Oakland...	Medium size, yellow with a red blush on sunny side; Medium to above medium quality; season autumn; not good enough in quality.
317	Quebec.....	R. Hamilton, Grenville..	'Large Fameuse Seedling D.' (See full description.)
318	"	" " ..	'No. 10.'—Medium size; pale yellow, well washed with bright crimson; quality good; season October to November. A handsome apple but not sufficiently promising.
319	"	" " ..	'No. 26.'—Below medium size; yellow well splashed and washed with dull crimson; quality good to very good; season November. Too small.
320	"	" " ..	'No. 36.'—Best keeping good apple; medium size; pale yellow splashed with crimson; quality medium; season early to midwinter. Not specially promising.
321	"	" " ..	'No. 4.—Keeper, light green, striped.' (See full description.)
322	"	" " ..	'X.—Resembles Salome.' Medium size; greenish yellow, faintly splashed with pink on sunny side; quality above medium; season early to mid or late winter; not good enough in quality.
323	"	A. J. Langlois, St. Malo.	Medium size; pale yellow splashed and washed on sunny side with crimson; quality good; season mid to late September; not sufficiently promising.
324	Ontario	Samuel Greenfield, Ottawa East.	'Greenfield Seedling.'—Medium to above medium in size; pale greenish yellow splashed and washed with crimson; quality above medium; season early to mid August; not equal to Lowland Raspberry.
325	"	Ed. Hall, Ottawa........	Medium size; greenish yellow, splashed and washed with crimson; quality medium to above medium; season evidently September to October. A handsome apple but not good enough in quality.
326	"	John McKay, Creemore.	Medium size; yellow well washed with dark crimson; medium quality; season mid to late September; not sufficiently promising.
327	"	C. L. Stephens, Orillia..	Below medium size; yellow with a faint pink blush; quality good; season evidently mid to late September; too small and not sufficiently attractive.
328 329	" ...	Thos. A. Harsant, Glen Orchard.	Two small apples of inferior quality; one pale yellow with a few crimson splashes; the other, pale yellow with a pink blush.
330	"	Wm. Pratt, Penetanguishene.	Medium size; yellow well splashed and washed with crimson; quality above medium; season evidently October. Handsome but not as good as Wealthy, which is of the same season.
331	"	Wm. Pratt. Penetanguishene.	See full description.
332	"	J. J. McGovern, Ottawa.	Large; pale yellowish green splashed and streaked with dull purplish red; quality medium; season evidently October.
333	"	R. Couglan, M.D., Hastings.	See full description.
334	"	R. A. Marrison, Cataraqui.	See full description.
335	"	E. Lafontaine, Ottawa..	Size above medium; greenish yellow splashed and washed with crimson; quality above medium; season October; not sufficiently promising.
336	"	Louis Charron, Ottawa..	Large; pale green with a crimson blush on sunny side; quality above medium; season probably October to November; not sufficiently promising.
337	"	Sam. Greenfield, Ottawa East.	'Greenfield No. 6.'—Above medium size; pale green splashed and streaked with dull red on sunny side; quality good; season late autumn to early winter; not attractive in appearance. Not as good as McIntosh which is of the same season.
338	"	Sam. Greenfield, Ottawa East.	'Greenfield No. 5.'—Above medium to large; yellow well washed with rather bright crimson; quality above medium; season evidently October to November; not juicy enough for a good sweet apple.
339	"	W. L. Scott, Ottawa.....	See full description.

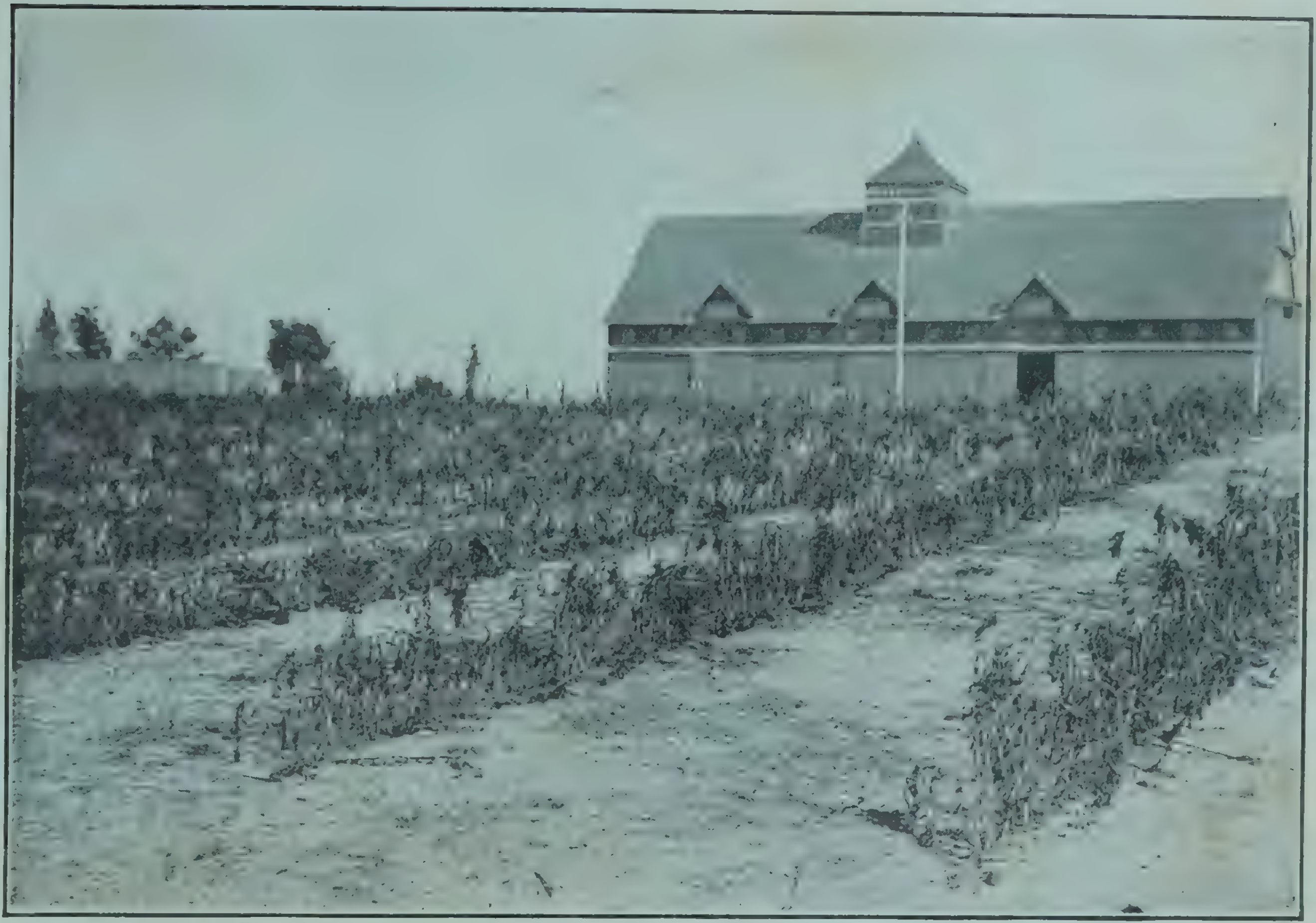

Photo. by F, T. Shutt.

English Horse Beans, used for Snow and Wind-break. April 26th, 1905.

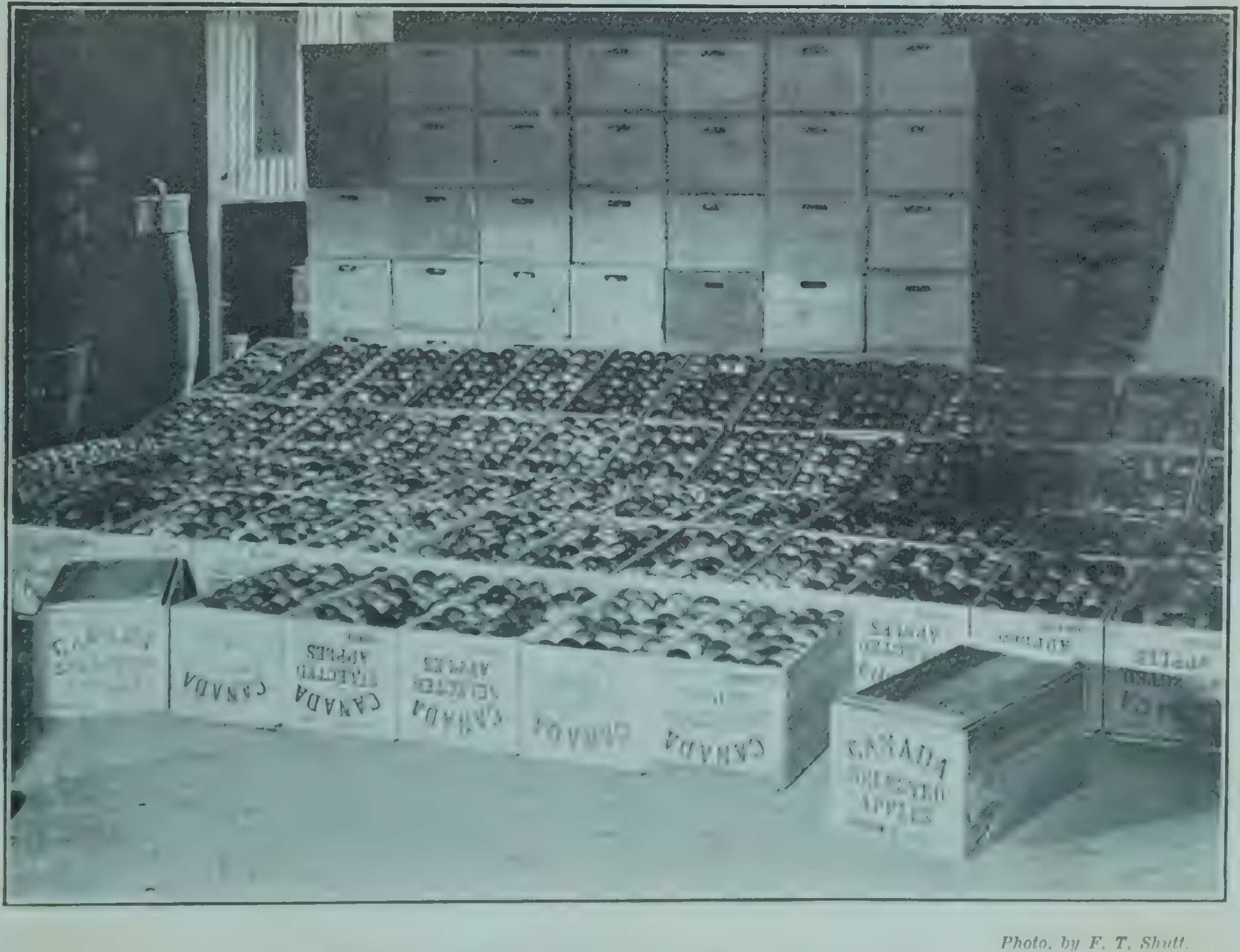

Photo. by F. T. Shutt.

Wealthy Apples Packed for Shipment to Glasgow.

Record.	Province.	Name and Address of Sender.	Description of Fruit.
340	Manitoba ..	A. H. Rogers, Gladstone.	Seedling No. 1.—Small, 1½ by 1¾ inch.; greenish yellow; quality above medium; season evidently October.
341	" ..	" " ..	Seedling No. 2.—Small, 1¼ by 1½ inch.; yellow, with a bronze blush on sunny side; quality medium to below; season evidently October; not very promising.
342	" ..	" " ..	Seedling No. 3.—Quite small; green well washed with deep crimson; too small.
343	Ontario ...	W. C. Wilson, Hawkstone.	Medium size; yellow, washed and splashed with orange red; mildly subacid; season late winter; not sufficiently promising.
344	"	Maggie McLaurin, Dalkeith.	See full description of 'Craignaivie.'
345	Quebec.....	W. L. Rowell, Ayer's Cliff.	See full description of 'Lincoln.'

APPLES.

No. 317. From R. Hamilton, Grenville, Que.—Large Fameuse Seedling, D.—Fruit above medium size; form oblate; cavity medium depth and width; russeted at base; stem short, moderately stout; basin open, medium depth, nearly smooth; calyx open; colour pale yellow or whitish well washed and splashed with crimson; dots obsecure; skin moderately thick, rather tough; flesh white, slightly tinged with red, tender, juicy; core medium; subacid, pleasant, Fameuse-like flavour; quality good to very good; season probably October to mid November.

A good dessert apple, much like Fameuse in quality but coarser in flesh.

No. 321. From R. Hamilton, Grenville, Que., 'Keeper, light green, striped with red, well coloured on top of tree. No. 4.'—Fruit medium size; form roundish to oblate; cavity open, deep; stem short, moderately stout; basin medium depth and width, wrinkled; calyx closed; colour pale greenish yellow washed with red on sunny side; dots indistinct; skin moderately thick, tender; flesh white, tender, juicy; core small; mildly subacid, pleasant flavour; quality good to very good; season probably early to mid winter.

A good deal like Princess Louise both in appearance and quality. May be promising.

No. 331. From Wm. Pratt, Penetanguishene, Ont., Seedling No. 2.—Fruit medium size; form roundish; cavity narrow, medium depth; stem medium length, moderately stout; basin medium depth and width, wrinkled; calyx partly open or closed; colour yellow well washed and splashed with rich crimson; dots numerous, yellow, distinct; skin moderately thick, rather tough; flesh dull white, firm, juicy; core small; subacid, pleasant flavour, not high; quality above medium; almost good; season probably early winter to mid winter. Supposed to be a seedling of Wealthy. Grown on an adjoining farm to Wm. Pratt. A handsome apple.

No. 333. From R. Couglan, (M.D.), Hastings, Ont.—Fruit medium size; form oblate to roundish; cavity deep, medium width, russeted; stem short, slender; basin medium depth and width, smooth; calyx partly open; colour yellow, almost entirely covered with bright crimson; dots moderately numerous, yellow, distinct; skin moderately thick, tender; flesh white, tinged with red, tender, juicy; core small; briskly subacid, little decided flavour, quality above medium; season probably mid September.

A seedling growing in a remote part of farm near Hastings village.

A very handsome apple with an aroma. Of good shape. May prove a useful apple at this season of the year.

No. 334. From R. A. Marrison, Cataraqui, Ont., Seedling Crab Apple.—Fruit large for a crab; 2 by 2½ inches; form roundish, slightly angular; cavity medium depth and width; stem long, slender; basin open, medium depth, much wrinkled; calyx closed; colour yellow well washed with deep crimson and splashed with dark crimson; dots few, yellow, distince; skin moderately thick, moderately tough; flesh yellow, tender, juicy; core medium; briskly subacid, pleasant flavour, very little astringency; quality good for a crab; season probably early to mid October.

A handsome crab of the largest size. May prove desirable as a late variety.

No. 344. Craignaivie—Seedling from Maggie McLaurin, Dalkeith, Ont.—Fruit large; form roundish to oblate, conic; cavity deep, medium width; stem medium length, moderately stout; basin medium depth and width, wrinkled; calyx closed; colour pale yellow, well washed on sunny side with bright red; dots obscure; skin rather thin, tender; flesh white, tender, melting, juicy; core medium, mildly subacid; quality good to very good; season probably mid winter to late winter.

A handsome apple of good quality, and if hardy may be useful. 'A graft from a seedling planted by my father long years ago. Very good cookers and bakers.'

No. 345. Lincoln—Seedling from W. L. Rowell, Ayer's Cliff, P.Q.—Fruit above medium size; form roundish conical; cavity narrow, shallow; stem short, slender; basin shallow, narrow; calyx closed; colour pale yellowish green splashed and washed with dull dark purplish red; dots obscure, skin thick, tough; flesh white, tender, juicy; core medium; mildly subacid, pleasant flavour; quality good; season probably mid to late winter. Resembles Winter St. Lawrence very much in outward appearance. A good dessert apple.

APPLES.

After the severe winter of 1903-04, which killed so many varieties of apples in the orchard at the Experimental Farm, a number of trees not killed outright were left in a weakened condition. Most of these either died since or have been removed, so that quite a number of vacancies occurred in the orchard this year. These were practically all filled by other kinds or by more trees of the varieties which withstood the winter of 1903-4. The winter of 1904-5 was a favourable one and few additional kinds were injured. There are still in the apple orchards 435 varieties exclusive of the seedlings originated at the Central Experimental Farm. Owing to the favourable season, the trees made fine growth this year. The crop was good and the fruit clean, being practically free of both spot and codling moth. The early varieties were sprayed three times with Bordeaux mixture, and the later ones four times. There were 193 varieties which fruited.

Three different cover crops consisting of hairy vetch, rape and buckwheat were used this year to aid in protecting the roots of trees this winter in the standard orchard. The Russian orchard was in sod this year, but this will be broken up in the spring.

VARIETIES OF APPLES NEW OR NOT WELL KNOWN IN ONTARIO AND QUEBEC.

Many descriptions of apples have been made at the Central Experimental Farm during the past eighteen years, and a large number have been published from time to time in the annual reports, but as there are many others which have not been, it is considered advisable to continue publishing descriptions of the newer and not well known sorts. The following descriptions were all made from fruit grown at the Central Experimental Farm, with a few exceptions, from outside sources, which are mentioned.

Allen Choice.—Originated in Pennsylvania:—Fruit below medium size; form oblate; cavity medium depth and width; stem short to medium, moderately stout; basin shallow, open, wrinkled; calyx open; colour pale yellow splashed and washed with deep red; dots moderately numerous, grey, distinct; skin moderately thick, tender; flesh yellowish, crisp, juicy; core small; subacid, pleasant flavour, sprightly; quality good; season mid winter to late winter.

A pretty apple of good quality. A little under sized, but evidently a good keeper. Not sufficiently hardy at Ottawa.

Arthur.—Originated in Northern Iowa:—Fruit roundish to oblong; size medium; cavity deep, narrow, slightly russeted near base; stem long, slender; basin deep, medium width, smooth; calyx open or closed; colour yellow splashed and streaked with purplish red, mostly on sunny side; dots moderately numerous, grey, distinct; skin thick, rather tough; flesh yellow, rather coarse, moderately juicy, subacid; core small to medium; quality medium; season early to mid winter. Tree hardy, vigorous and productive, but not desirable here.

Bessie.—Originated in Wisconsin:—Fruit roundish, angular; size large to very large; cavity deep, medium width, russeted; stem short, stout; basin deep, medium width, almost smooth; calyx open; colour pale yellow well splashed and streaked with bright red; dots few, pale, indistinct; skin moderately thick, tender; flesh white, crisp, rather coarse, juicy, subacid; core small; quality above medium; season late September, October. Tree hardy, vigorous and a moderate bearer. A large, handsome apple, but too coarse for dessert.

Bismarck.—Originated in New Zealand:—Fruit roundish, conical; size large; cavity deep, medium width, russeted; stem short, slender; basin deep, open, wrinkled; calyx open; colour greenish yellow, well washed and splashed with rich crimson; dots obscure; skin moderately thick, moderately tough; flesh dull white, coarse, juicy subacid; core small; quality medium; season November, December. Tree a poor grower, but an early and abundant bearer. Quality not good enough. Of doubtful hardiness. Fruit received from W. H. Dempsy, Trenton, Ont.

Black Annette.—Originated in Ohio:—Fruit roundish; size small; cavity medium depth and width, russeted; stem medium length, slender; basin open, shallow, wrinkled; calyx open; colour yellowish green washed with deep, dull purplish red; dots numerous, small, pale distinct; skin rather thick, tough; flesh greenish yellow, moderately juicy, tender; core medium; briskly subacid, somewhat like R. I. Greening in flavour; quality above medium; season late winter. Tree an early bearer. Hardy until winter of 1903-4.

Brockville Beauty.—Originated in Eastern Ontario:—Fruit roundish, conical; size medium to above medium; cavity open, medium depth; stem short, stout; basin medium depth and width, slightly wrinkled; calyx open; colour pale yellow well washed and splashed with orange red; dots obscured; bloom none; skin rather thick, tender; flesh yellow, firm, coarse, moderately juicy, brickly subacid; core medium; quality above medium; season early September. Tree vigorous and productive, but fruit drops badly. A pretty apple.

Cellini.—Originated in England:—Fruit roundish, obtusely conical; size large to very large; cavity medium depth and width or rather open, russeted; stem medium length, stout; basin deep, very open, slightly wrinkled; calyx open; colour greenish yellow well washed and splashed with deep red; dots obscure; skin rather thick, tender; flesh white, tinged with yellow; tender, melting, moderately juicy; core small, briskly subacid with a high flavour; quality good to very good; season late October to November. Quite hardy at Ottawa. Tree vigorous and productive.

Clayton.—Originated in Indiana:—Fruit above medium size; form oblate, conic, angular; basin medium depth and width, slightly wrinkled; cavity medium depth, open, stem short to medium, stout; calyx partly open; colour pale green washed and splashed with dull red; dots few, pale, indistinct; skin thick, tough; flesh firm, crisp, greenish yellow, juicy; core rather small; subacid not high flavour; quality above medium; season late winter. A good keeper. Not quite hardy enough at Ottawa.

Coo's River Beauty:—Fruit, medium to large size; form oblate; cavity deep, open, lightly russeted; stem very short, slender; basin deep, medium width almost smooth, calyx open; colour pale yellow well washed with bright crimson; dots few, yellow, distinct; skin moderately thick, tough; flesh white, crisp, tender, juicy; core medium; subacid, sprightly, pleasant flavour; quality good to very good; season early to mid winter.

A handsome apple. A promising variety for the best apple districts. Fruit received from W. H. Dempsey, Trenton, Ont.

Dyer (Pomme Royale).—Originated in France:—Fruit roundish; size medium; cavity medium depth and width; stem medium length, moderately stout; basin medium depth and width, wrinkled; calyx closed; colour pale yellow; dots obscure; skin moderately thick, tender; flesh white, very tender, breaking, very juicy, pear-like; core medium size, open; mildly subacid, with a sprightly, delicious, pear-like flavour; quality best; season October. Hardy in garden of Maurice Bennett, Ottawa, from which fruit was obtained and described.

Duke of Connaught:—Fruit oblong, conical; size large to above medium; cavity deep, narrow, sometimes slightly russeted; stem short, moderately stout; basin medium width, medium depth, wrinkled; calyx rather small, closed; colour golden yellow, sparingly splashed with pink on sunny side; dots numerous, grey, distinct but not conspicuous; bloom none; skin slightly oily, moderately thick, rather tough; flesh yellow, firm, fairly juicy; core large, open; subacid, pleasant flavour; quality above medium; season early to mid winter. Tree hardy and vigorous but not productive enough.

Excelsior Crab.—Originated in Minnesota.—Fruit roundish, angular; size very large for a crab, about the size of a medium apple, cavity narrow, shallow to medium in depth; stem long to medium, moderately stout; basin shallow to medium in depth, narrow, slightly wrinkled; calyx closed or partly open; colour pale yellow, well washed on sunny side with bright red; and extending nearly around the apple in some cases; dots few, yellow, distinct but not prominent; bloom slight; skin moderately thick, tender; flesh yellowish, tender melting, juicy; core large, open; subacid, pleasant flavour; quality good as a crab, above medium to good as an apple; season early to mid September. Tree vigorous and very productive. A handsome fruit, more like an apple than a crab, but flesh has some crab characteristics.

Fameuse Noire.—Originated in the province of Quebec:—Fruit roundish conical; size medium; cavity narrow, medium depth, slightly russeted near base; stem medium length, slender; basin narrow, medium depth, slightly wrinkled; calyx open; colour greenish yellow well splashed and washed with dark red over most of surface; dots few, small, yellow, distinct; skin moderately thick, tough; flesh white, tender, crisp, juicy, a slight tinge of red in spots; core small to below medium; mildly subacid, Fameuse-like flavour, but not as good; quality good; season mid October to mid November. Tree productive but lacks vigour. Not as good an apple as Fameuse.

Forest—Originated in Wisconsin:—Fruit above medium size; form oblong to roundish conical; cavity medium depth and width, sometimes lipped, russeted; stem short, stout; basin medium depth and width, wrinkled; calyx open; colour greenish yellow washed with deep rather dull red, mostly on sunny side; dots few, grey, distinct; skin thick, rather tough; flesh yellow, crisp, juicy; core small; subacid, good, pleasant flavour; quality good to very good; season mid to late winter. Tree hardy. Would be very promising if fruit was a little more attractive. Scions received from the late J. L. Budd, Ames, Ia.

Frazer's Russet.—Fruit about medium size; form roundish to oblate, obtusely conical; cavity medium depth, open, russeted; stem medium length, moderately stout; basin medium width and depth slightly wrinkled; calyx small, partly open; colour greenish yellow, sparingly splashed with purplish red on sunny side; dots obscure; skin moderately thick, tender; flesh dull white, crisp, somewhat coarse, moderately juicy; core small; mildly subacid, pleasant flavour; quality above medium to good; mid winter to late winter. Tree hardy.

Owing to hardiness of tree, this may prove a useful apple.

Hoadly.—Originated in Wisconsin:—Fruit oblate; size above medium; cavity deep, moderately open, slightly russeted; stem short, slender; basin medium depth and width, almost smooth to slightly wrinkled; calyx open, colour yellow splashed and streaked with carmine; dots few, yellow, indistinct; skin thick, moderately tender; flesh yellowish with traces of red, juicy, rather tender, briskly subacid; pleasant flavour; core medium; quality above medium; season October. Tree an upright grower, hardy and productive. Scions obtained from the late J. L. Budd, Ames, Iowa.

Langford Beauty (Russell).—Originated in Russell County, Ontario:—Fruit medium to above medium in size; roundish to oblate; skin pale yellow, almost or completely covered with deep red; dots few, grey, not prominent; cavity shallow, open; stem long, slender; basin shallow, open, slightly wrinkled; calyx closed; flesh white, tender, melting, juicy, subacid, with a pleasant flavour, having a suggestion of Fameuse about it, slightly astringent; core large; quality good; season middle of August to middle of September. Tree vigorous. Top grafted on Wealthy at the Central Experimental Farm; it has produced good crops every other year. It ripens unevenly and drops badly, making it more desirable for home use than for commercial purposes.

The apple described under the name of Russell in Bulletin No. 37, Experimental Farms Series, has been found to be the same as this variety.

Lord.—A seedling of Wealthy, originated in Minnesota:—Fruit roundish conical; size medium; cavity deep, medium width; stem medium length, moderately stout; basin deep, narrow to medium, slightly wrinkled; calyx partly open; colour pale yellow almost covered with crimson; dots obscure; skin thick, rather tough; flesh white tinged with red near skin, moderately juicy, tender; core small, briskly subacid, pleasant flavour; quality above medium to good; season November.

A handsome apple, but not specially promising. Not juicy enough.

Newell (Orange Winter).—Originated in Wisconsin:—Fruit oblate conic; size large; cavity deep, open; stem short, moderately stout; basin narrow, medium depth, wrinkled; calyx open; colour yellow, slightly washed with pink; dots fairly numerous, grey, distinct; skin moderately thick, tender; flesh yellow, crisp, moderately juicy; core medium size; subacid, spicy, good flavour; quality very good. Season, mid to late winter. Tree moderately productive, but not as hardy, as some others.

A pleasant dessert apple, but fruit is not attractive. May be useful.

Newtown Spitzenburg (Flushing Spitzenburg)—Originated on Long Island, N.Y.: —Fruit oblate to roundish, conical; above medium to large; cavity deep, narrow slightly russeted; stem short, moderately stout to slender; basin narrow, shallow, smooth, calyx open; colour yellow, well splashed and washed with deep orange red; dots fairly numerous, large, grey or yellow, distinct; skin moderately thick, tough;

flesh yellow, very tender, juicy; core medium, open; mildly subacid, pleasant flavour; quality good; season early winter.

October.—Originated in Minnesota:—Fruit roundish, angular; size medium to below; cavity deep, medium width, slightly russeted; stem medium length, moderately stout; basin shallow, medium width, considerably wrinkled; calyx closed or partly open; colour yellow, splashed and washed with deep red; dots few, yellow, indistinct; skin rather thick, tender; flesh yellowish, rather coarse, crisp, tender, moderately juicy, briskly subacid; core medium; quality almost good; season late September and early October. Tree vigorous and productive but fruit is very subject to dry rot making this variety quite undesirable.

Renaud (Argenteuil)—Originated in Argenteuil Co., Que.:—Fruit medium size, form oblate, irregular, angular; cavity narrow, medium depth; stem short, slender; basin medium depth and width, wrinkled; calyx closed; colour greenish yellow splashed and streaked with dull purplish red; dots obscure; skin moderately thick, tough; flesh yellowish, juicy, tender; core medium; briskly subacid, pleasant but not high flavour; quality above medium; season late winter.

May be useful but is not attractive.

Springdale.—Originated in Arkansas:—Fruit roundish ; size medium ; cavity narrow, medium depth; stem clubbed, short, stout; basin medium depth and width, smooth ; calyx open ; colour greenish yellow, well washed with dark red ; dots few, yellow, distinct; skin rather thick, tough; flesh white, firm, moderately juicy subacid; core small; quality above medium; season late winter. Not a very handsome apple, but is a good keeper.

Titovka (Gipsy Girl).—Originated in Russia:—Fruit roundish conical, angular; size large to very large; cavity deep, medium in width, slightly russeted ; stem short, stout; basin deep, medium width, wrinkled, calyx closed or open; colour pale yellow well splashed or almost covered with bright red ; dots obscure ; bloom none; skin moderately thick, tender; flesh, yellow, firm, rather coarse, juicy; core small, closed; subacid, not high flavoured; quality medium to above medium; season early September to mid September. Tree hardy, vigorous and productive. A handsome apple.

Walworth Pippin.—Originated in New Jersey:—Fruit roundish, obtusely conical, angular; size medium ; cavity medium depth and width ; stem short, slender ; basin narrow, medium depth, wrinkled; calyx closed; colour green with a faint blush; dots fairly numerous, large, white, distinct; skin moderately thick, tender; flesh greenish yellow, firm, juicy; core medium size; subacid, no decided flavour; quality medium; season late winter. Tree vigorous. Fruit does not mature well at Ottawa.

Stone.—Originated in Vermont:—Fruit large to very large; form roundish, irregular, angular; cavity narrow sometimes closed, shallow; stem short, slender; basin narrow, shallow, slightly wrinkled; calyx partly open; colour yellowish green, splashed and washed with dull, deep, purplish red; dots moderately numerous, grey, distinct; skin thick, tough; flesh yellowish, crisp, tender, juicy; core small; mildly subacid, spicy, good flavour; quality good; season mid winter to late winter.

Appearance is rather against this apple, as it is not attractive, but it is a fair dessert apple. Tree apparently very hardy.

Winter Rose.—Originated in Dundas county, Ontario:—Fruit oblate; size above medium ; cavity medium depth, narrow, lipped towards base of stem; stem short, moderately stout; basin narrow, shallow to medium, slightly wrinkled; calyx partly open or open; colour yellowish green well washed with dull red; dots obscure ; skin rather thick, tough; flesh white, tender, moderately juicy subacid; core small; quality above medium; season early to mid winter. Tree hardy, vigorous and an early bearer. May be useful in the north.

A CLOSELY PLANTED WEALTHY APPLE ORCHARD.

Considerable interest has been shown in the results obtained from a small, closely planted Wealthy apple orchard at the Central Experimental Farm. There are 129 trees now living in this orchard, occupying about one-third of an acre. The trees were originally 10 x 10 feet apart, but a few have died. The trees were planted in the spring of 1896. Full details regarding the returns from this orchard were published in the annual report for 1904. In that report it was shown that the average net profit per acre from the time of planting was $54.13, and from the time of fruiting, $106.19. There was a heavy crop in the orchard in 1904, and the crop this year was medium. The total crop produced was 1,247 gallons, of which 631 was picked fruit and 616 windfalls. Part of the windfalls was sold in baskets as they were good apples, and they brought fair prices.

The following sales were made:—

SALE OF FRUIT FROM CLOSELY PLANTED WEALTHY ORCHARD, 1905.

		Estimated per acre.
Sold, 203 baskets at 17½	$ 35 52	$107 45
“ 22 baskets at 20c	4 40	13 31
“ 2 bags at 25c	0 50	1 51
“ 42 boxes (Glasgow) at $1.46	61 32	185 49
	$101 74	$307 76

Expenses, 1905.

225 baskets and covers at $5.25 per 100	$ 11 81	$ 35 73
42 boxes at 14½c	6 09	18 42
Freight on boxes	14 94	45 19
Commission on sales	6 92	20 93
Rent on land	0 99	3 00
Spraying	2 49	7 53
Picking fruit	9 00	27 22
Grading and packing fruit	8 41	25 44
Barnyard manure (8 tons at 50c)	4 00	12 10
Pruning	3 00	9 07
	$67 65	$204 63
Net profit, 1905	34 09	103 13
Average net profit per acre per year, 1896-1905		59 03
“ “ 1899-1905		105 75

These receipts and expenditures are estimated from about one-third of an acre ($\frac{40}{121}$) and the estimated figures per acre are given on the assumption that the percentage of sales in boxes and baskets would be the same from a full acre. A record is kept of the time actually spent in caring for this orchard and the other expenses incurred. Labour is valued at 15 cents an hour. There was no expense for cultivating since 1902, as the trees being close, cultivation is impossible. The grass that grows is left to die down and rot. As the trees were beginning to interlace, about half of them were severely headed back in the spring of 1905, and the remainder will be thus treated next spring. The apples on the trees headed back were much larger than on the others, and while the crop was reduced somewhat the greater percentage of marketable fruit compensated to a considerable extent for the loss of crop. The orchard received a heavy application of barnyard manure in December, 1904.

EXPERIMENTAL APPLE SHIPMENT TO GLASGOW, 1905.

This year a small shipment of 80 boxes of apples was made to Glasgow by the steamer 'Lakonia,' which sailed from Montreal on October 5.

One object of the shipment was to market the fruit raised at the Experimental Farm to the best advantage, and another was to compare the results from different methods of packing. Two styles of boxes were also compared. All the fruit was shipped in boxes 10 by 11 by 20 inches, and consigned to Thos. Russell, Fruit Bazaar, Glasgow, Scotland.

32 boxes XXX Wealthy, without any packing material in boxes, sold at 6 shillings per box.

26 boxes XXX Wealthy, with thin layer of Excelsior and a sheet of cardboard at top and bottom, sold at 6 shillings per box.

11 boxes Winter St. Lawrence, without any packing material in boxes, sold at 5 shillings per box.

11 boxes Patten's Duchess (Myer's folding boxes), without any packing material in boxes, sold at 4 shillings per box.

Total receipts for 80 boxes	$ 109 09
Freight on goods: River and Harbour Duties, &c., Marine Insurance: Commission and guarantee	33 91
Cost of boxes	11 65
Sorting and packing	14 40
Total expenses	$ 59 96
Net profit	$ 49 13

While the profit on this shipment is not large, it is very fair for autumn apples. In a small shipment of this kind the price of boxes and the cost of sorting and packing are greater than they would be if large quantities were handled.

The following correspondence was received regarding this shipment:—

'GLASGOW, October 28, 1905.

'We beg to send you herewith account sales for your consignment of 80 boxes of apples ex S. S. 'Lakonia' and draft for L 15-8-9 sterling in payment of net proceeds, which please acknowledge. I trust the result of this experimental consignment will be satisfactory to you, and have to report that the fruit arrived here in good condition, and we could see no difference in quality or landing condition of the Wealthy packed with Excelsior and the difference in boxes did not seem to make any difference in the carrying of the fruit, for although the Patten's Duchess packed in the new style of box (Myer's folding box) made only 4—as compared with 6—for the Wealthy, still this is accounted for by the fact that Wealthy are a much more popular apple here.'

(Signed) THOMAS RUSSELL.

Apple shipment to Winnipeg:—Fifty boxes of apples, consisting of Antonovka, Golden White and Anis were shipped to Winnipeg on September 21, 1905. After deducting freight and commission the net return from this shipment was $35.10, or about 70c. per box.

Final statement of shipments made in 1904:—In the Annual Report for 1904 a statement was made regarding six trial shipments of apples to Ireland and Scotland. The prices obtained for the fruit and other details were given in the report, but as the charges on four of the shipments had not been received when the report was published it was not possible to give the profit or loss. As the markets were glutted with fruit when the apples were sold, and hence the prices obtained small, there was a small loss on these four shipments, although the other two gave fair profits. The net returns from the 350 boxes in question were $78.87, or 22.53 cents per box. The boxes cost 14½c. each and deducting this from 22·53c. there are left but 8c. for sorting and packing, which does not cover the cost of this work.

INDIVIDUALITY OF FRUITS.

In the annual report for 1903 attention was drawn to the marked difference in yields of trees of the same variety of apple planted at the same time and under apparently very similar conditions. A table was published giving the yields of some trees from the time, the first records were taken until 1903. Following will be found the same table with the addition of the yields for 1904 and 1905. It will be noticed that Wealthy, Tree 4; McMahan White, Tree 1; McIntosh Red, Tree 1; and Patten's Greening, Tree 1, which had yielded the most up to 1903, still prove the most productive, though some of the other trees have gained on them. It is of interest to note the variation in yield of the different trees from year to year. Trees are being propagated from the most productive and from the least productive trees in order to find if these characteristics are retained in other trees. Top grafts have also been made for the same purpose.

APPLES—WEALTHY.

(Planted, 1896)—Yielded in Gallons.

Tree.	1899.	1900.	1901.	1902.	1903.	1904.	1905.	Total Yield 1899-1905.
1	1·0	2·25	2·75	15·0	....	17·0	1·0	39·0
2	2·0	·5	2·5	12·0	....	14·0	8·0	39·0
3	1·75	12·0	2·25	8·0	....	6·5	7·0	37·5
4	9·0	2·25	15·5	20·5	27·0	1·0	28·0	103·25
5	7·5	6·5	7·75	23·0	7·5	23·0	13·0	88·25
6	3·25	6·5	3·5	24 0	....	17·5	5·0	59·75
7	7·5	1·0	10·0	19 0	16·0	....	19·0	72·5
8	....	8·5	·5	21·5	....	10·0	5·0	45·5
9	....	11·25	·25	27·5	....	21·0	20·0	80·0
10	1·0	12·25	....	30·0	....	17·5	8·0	68·75
11	1·25	11·25	....	21·5	....	31·0	10·0	75·0
12	....	7·5	....	18·5	2·0	13·5	13·5	55·0
13	4·25	6·25	4·5	20·0	·5	20·5	19·0	75·0
14	2·5	5·5	·5	34·0	....	17·0	8·0	67·5
15	....	2·25	3·5	21·5	8·5	31·5	16·0	83·25
16	3·0	2·25	4·0	22·5	4·5	16·5	23·5	76·25
17	....	2·0	1·0	22·5	....	8·5	16·0	50·0

APPLES—McMAHAN WHITE.

(Planted, 1888)—Yielded in Gallons.

Tree.	1898.	1899.	1900.	1901.	1902.	1903.	1904.	1905.	Total Yield 1899–1905
1	62·0	....	83·0	2·0	147·0	1·5	141·0	40·0	476·5
2	42·0	1·0	6·0	12·5	98·0	23·0	116·0	30·0	328·5
3	32·0	29·0	49·0	18·0	55·0	63·5	56·0	108·0	410·5
4	35·0	....	34·5	4·0	63·0	34·0	67·0	69·0	306·5
5	....	37·5	55·0	49·0	....	61·0	....	98·0	300·5
6	29·0	4·5	46·0	·5	69·5	43·0	72·0	96·0	360·5
7	·5	9·5	19·5	4·0	19·0	39·5	14·0	37·0	143·0
8	7·0	9·0	27·0	9·0	53·0	15·5	54·0	35·5	210·0

APPLES—McINTOSH RED.

(Planted, 1890)—Yielded in Gallons.

Tree.	1898.	1899.	1900.	1901.	1902.	1903.	1904.	1905.	Total Yield 1899–1905
1	17·5	26·0	37·0	6·5	71·5	94·0	12·0	109·0	373·5
2	1·0	9·5	10·5	1·0	37·5	31·0	6·0	72·0	168·5

APPLES—PATTEN'S GREENING.

(Planted, 1892)—Yielded in Gallons.

Tree.	1898.	1899.	1900.	1901.	1902.	1903.	1904.	1905.	Total Yield 1899–1905.
1	27·0	2·0	35·0	1·5	71·0	15·0	84·0	34·0	269·5
2	2·0	6·0	14·0	19·0	24·0	55·5	7·5	66·0	194·0
3	2·0	31·0	1·5	40·5	22·0	67·0	26·0	69·0	259·0
4	13·0	....	6·5	....	12·0	15·0	45·0	45·0	136·5
5	1·0	....	19·0	·5	17·5	21·0	54·0	75·0	188·0

PLUMS.

There was a good crop of plums this year, but most of the fruit consisted of Americana and Nigra varieties. A few European or Domestica plums had a light to medium crop. The largest crop of Domestica plums was from the Mount Royal, one of the Montreal seedlings. The Mount Royal and Raynes are two of the hardiest of these seedlings and are very desirable plums. The Americana plums sold well. There were 457 baskets sold, for which $138.25 was received. The highest price received was 47½ cents per basket, and the lowest, 22½ cents. The average price was 29½ cents.

One new Experimental Farm Americana seedling of merit was named this year, a description of which follows:—

Kilmore (Yosemite Purple Seedling):—Size large; form roundish, slightly flattened; cavity medium depth and width; suture a distinct line; colour bright purplish red; dots moderately numerous, yellow, distinct; bloom moderate; skin moderately thick, moderately tough; flesh deep yellow, juicy; stone above medium, oval, considerably flattened, almost free; sweet, rich, good flavour; quality good. Promising. Season medium late.

CHERRIES.

As a rule the fruit buds of practically all varieties of cherries are winter-killed at the Central Experimental Farm. When, however, there are no very low temperatures there is a fair crop on a few varieties. Last winter the lowest temperature was only 20·6° F. below zero and there were no long spells of very cold weather, hence it was a little more favourable for cherries. As a result a few varieties produced fair crops. These were Orel 25, Vladimir, Minnesota Ostheim, Cerise d'Ostheim, Lithaur Weichsel, Heart-shaped Weichsel, Griotte du Nord, and Orel 24. The best crops were on trees of the first four varieties, which have in the past shown themselves to be of greater hardiness in fruit bud than others. The Orel 25 is probably the hardiest of all.

PEARS.

Pears are not a success at Ottawa, none of the better varieties having survived. The Flemish Beauty has proven the hardiest good pear, but the tree blights and it does not live long. At Oka, lower down the Ottawa river, this variety succeeds well. The Goliva Kurskaya, Dvinnoe Solovieff, and Zuckerbirn, which are among the hardiest and freest from blight, fruited this year, but they are all of inferior quality. Some seedling pears are being grown in the hope of getting some better hardy sorts.

GRAPES.

This was only a moderately favourable season for grapes. The crop was probably the largest that the vines have borne and the bunches were well filled and the fruit of good size and little affected by disease, but owing to the comparatively cool autumn and the cool nights the grapes did not become as sweet as they sometimes do. Robins were very troublesome and at the beginning of the season destroyed a large quantity of grapes, a flock of these birds apparently making their headquarters near the vineyard. The birds did not wait until the fruit was ripe the acidity of some of the varieties apparently suiting their taste. The varieties chosen were with thin skins, such as Canada, Brant, Peabody, Poughkeepsie and Delaware.

There were 90 varieties which ripened. As this was an unfavourable season for early ripening, it will be useful to record the names of those which ripened first, as these may be relied on to ripen almost every year.

Grapes which ripened earliest, 1905:—Florence, September 16, Champion, Manito, Early Daisy, September 18; Moore's Early, Early Ohio, September 20; Moyer, Golden Drop, Bonne Madame, Pattison, Campbell's Early, September 23; Janesville, Telegraph, Marion, Jewel, Canada, September 30. Brant and Peabody were nearly all eaten by birds, but they usually ripen about the same time as Canada.

The Lincoln (Read's hybrid) grape, which ripened early last year, did not ripen this year until after the above named varieties, but the vines are in a low part of the vineyard and the nights being cool ripening was delayed. This is a very promising sort, being a heavy bearer with uniform bunches and fruit of rather good quality.

Of grapes not yet described in this report the following is a rather promising variety for home use, being among the earliest:—

Early Daisy:—This variety was originated by John Kready, Mount Joy, Pa.
It was first planted at the Central Experimental Farm in the spring of 1901, has fruited for the past two seasons and has been one of the very earliest to ripen. Vine a medium grower and up to the present time rather a light bearer. Bunch small, moderately compact; fruit below medium size, round, black with a blue bloom; skin thick, tough; pulp firm; stones large; sweet but not high flavoured. Quality above medium. As early as Champion or earlier and much superior to it in quality. On account of its extreme earliness it should prove valuable for home use.

NEW BLACK CURRANTS.

In 1887, when Dr. Wm. Saunders, Director of the Dominion Experimental Farms, moved to Ottawa from London, Ont., he brought with him from his garden in London about 150 seedling black currants. These had been raised by Dr. Saunders from an extra fine seedling of a Black Naples seedling obtained by him from a former lot of seedlings grown in 1879. There are still growing at the Central Experimental Farm 28 of the best of those brought from London, and a few others originated at Ottawa. This number will be still further reduced in the next plantation. After eighteen years' experience with these currants, it is possible to form a good estimate of their relative value with other kinds now on the market. The following twelve varieties, which are given in order of productiveness, are practically all considered equal to any other named variety yet tested at Ottawa, and most of them are superior:—

Ogden:—Bush a medium to strong grower and the most productive black currant tested. Bunches medium to small. Fruit uneven in size, below to above medium; skin moderately thick, fairly tender; briskly subacid; quality medium; ripens unevenly. Season medium to late. Where great productiveness is desired and where size or quality is not important, this variety is recommended.

Saunders:—Bush a strong grower and very productive. Bunches medium size. Fruit above medium to large; skin thick; briskly subacid; quality medium. Season medium. One of the most promising commercial varieties. This is already offered for sale in Canada.

Kerry:—Bush a strong grower and very productive. Bunches medium to large. Fruit above medium to large; skin thick but tender; briskly subacid; quality above medium to good. Season medium to late. One of the most promising for commercial purposes on account of its great productiveness and good size of fruit.

Ontario:—Bush a strong grower and very productive. Bunches medium size. Fruit medium to above medium in size; skin moderately thick, tender; briskly subacid; quality medium to good. Ripens evenly. Season medium. Promising on account of productiveness.

Eclipse:—Bush a medium to strong grower and productive. Bunches large. Fruit medium to large; skin moderately thick, fairly tender; subacid; quality good; ripens evenly. Season early. Promising on account of productiveness, size and quality.

Magnus:—Bush a strong grower and very productive. Clusters medium in size. Fruit large; skin rather thick; subacid, good flavour; quality good. Season medium. Promising on account of productiveness, size of fruit and quality.

Ethel:—Bush a strong grower and productive. Bunches large. Fruit above medium size; skin rather thick; briskly subacid. Quality above medium. Fruit ripens evenly. Season medium. Promising on account of productiveness and size of fruit.

Climax:—Bush a strong grower and productive. Bunches large. Fruit above medium to large. Skin moderately thick, fairly tender, briskly subacid, good flavour; quality good. Season medium late. One of the most promising.

Success:—Bush a medium grower, but productive. Bunches medium size. Fruit large; skin moderately thick, tender, subacid, good flavour; quality good to very good. Ripens evenly. Season very early. Promising on account of earliness, size of fruit and quality.

Clipper:—Bush a strong grower and productive. Bunches large. Fruit medium to large; skin moderately thick, tender; briskly subacid, good flavour. Quality good. Fruit ripens somewhat unevenly. Season medium late. Promising.

Winona:—Bush a medium grower, productive. Bunches small to medium. Fruit above medium to large; subacid; quality good. Ripens evenly. Season early.

Topsy:—Bush a strong grower, moderately productive. Bunches large. Fruit above medium to large; clings well. Skin rather thick; briskly subacid; good flavour; quality good to very good. Season medium. This originated as a hybrid between Dempsey's Black Currant and a cross-bred gooseberry (Houghton X. Broom Girl). From this cross five plants grew. Of these, four had gooseberry foliage and one, the Topsy, black currant foliage and fruit.

RASPBERRIES.

The raspberry canes were bent down in the autumn of 1904 for protection as usual and came through the winter, in most cases, in fine condition. The crop of fruit was good this year.

Of all the varieties under test, the Herbert, a seedling originated by Mr. R. B. Whyte, Ottawa, Ont., is decidedly the best for this district. This variety has already been referred to and described in the previous reports, but a few more words may be said of it here. It is hardy, vigorous and very productive. The fruit is of the largest size and of good colour, and good quality. It is not quite as firm as Cuthbert, but in every other respect is superior to that variety at Ottawa. The Herbert is now for sale in Canada and the United States.

STRAWBERRIES.

There were 203 named varieties of strawberries under test this year. The crop, on the whole, was a medium one, but not so large as in some seasons, the plants of most varieties not having made many runners in 1904, when the plantation was made, and there being some injury from winter. In the variety tests a plantation is usually left to fruit for two seasons, as when the plants are not set very early in the spring the crop, the first year after planting, is not so large as the second. For commercial planting, however, it usually pays best to set the plants as early in the spring as possible, leaving a long season for making runners and taking only one crop from a plantation, as when many runners are made the plants become crowded the second year and the fruit is often small.

In the following table will be found a list of the fifty varieties which have given the best average yield in a test of from two to five years. Of these the Sample, Buster, Bisel, Glen Mary, Greenville, Beder Wood, Marie, Warfield, Enhance Barton's Eclipse, Thompson's Late, Dora, Daisy, Howard's 41, and Splendid, are among the most satisfactory, taking into consideration other qualities as well as yield. In addition to the above, Bubach and Lovett are two excellent varieties for home use, and Williams is one of the best for long distance shipment, although the Pocomoke, a firm newer variety, has yielded better and may take its place. The Early Beauty is a promising new early variety. The Afton, Daniel Boone and Stevens' Early, whch have averaged a little better than Warfield in yield, are almost, if not quite, identical with the latter variety.

Average Rank.	Number of years averaged.	Rank, 1905.	Name.	Date of full bloom, 1905.	Date of first ripe fruit, 1905.	Date of first picking, 1905.	Date of last picking, 1905.	Number of pickings, 1905.	Weight of 25 average berries, 1905.	Total yield, 1905.		Average total yield.	
									Oz.	Lbs.	Oz.	Lbs.	Oz.
1	2	1	Pocomoke ....B..	June 6	June 24	June 27	July 14	7	7	23	4	22	11
2	5	15	Sample..................P..	" 5	" 26	" 27	" 18	8	7	15	3	21	5
3	5	42	Bisel.....................P..	" 5	" 27	" 29	" 18	7	6½	10	4½	19	7¼
4	5	73	Buster... ....P..	" 7	" 26	" 27	" 14	7	7½	7	14¼	19	5
5	4	190	Mele ... .P..	" 7	" 27	" 29	" 14	5	6¼	2	1	19	2¼
6	5	34	Glen Mary............B..	" 5	" 26	" 29	" 18	8	7½	11	2¼	18	15
7	5	19	Greenville.............P..	" 5	" 24	" 27	" 14	7	7	13	0	18	13
8	5	18	Daniel Boone..... ..P..	" 2	" 21	" 24	" 14	8	5	13	3¾	18	10¼
9	5	65	Stevens' Early....... P..	" 5	" 21	" 24	" 14	9	5	8	8½	18	6½
10	5	161	Afton.....................P..	" 5	" 24	" 27	" 11	6	5	3	2	17	13½
11	2	14	Splendid................B..	" 5	" 24	" 27	" 18	8	6½	15	4¼	17	9¼
12	5	121	Daisy.......... ....P..	" 5	" 24	" 27	" 14	7	6½	4	15½	17	8
13	5	9	Maggie........ ... .P..	" 5	" 24	" 27	" 14	7	6	16	11	17	3½
14	5	16	Dora ....P..	" 7	" 23	" 24	" 14	8	6½	15	2	16	15½
15	5	20	Carleton................P..	" 5	" 21	" 24	" 18	10	6½	12	11¾	16	14¼
16	5	123	Howard's 41. ....P..	" 7	" 26	" 27	" 14	7	6	4	14	16	12½
17	5	182	Enhance.................B..	" 5	" 24	" 27	" 11	6	6	2	6½	16	1
18	5	3	Carrie....................P..	" 8	" 29	" 30	" 18	6	7	18	9	16	1
19	5	146	Warfield, No. 2 .....P..	" 2	" 23	" 27	" 14	7	5¾	3	15	15	12½
20	5	72	Thompson's Late.....P..	" 5	" 27	July 3	" 18	6	5½	7	14½	15	8½
21	5	129	Beder Wood..........B..	" 2	" 23	June 24	" 11	8	5	4	13	15	7½
22	2	17	Early Beauty........B..	" 2	" 19	" 24	" 14	6	4¾	7	8½	15	6¾
23	4	88	Cole's Seedling.... ..B..	" 8	" 28	" 30	" 18	7	6½	6	15½	15	2
24	2	58	Lyon... ....P..	" 8	" 25	" 27	" 14	7	6½	9	2½	15	0
25	5	183	Barton's Eclipse.. ...P..	" 5	" 28	" 29	" 11	5	6¼	2	6¼	14	12
26	5	101	Swindle......... ....P..	" 2	" 26	" 27	" 18	8	6	6	5	14	11
27	5	67	John Little.... ......P..	" 5	" 23	" 24	" 14	9	5	8	3½	14	11
28	5	70	Wonderful.............P..	" 5	" 23	" 24	" 11	7	6	8	0	14	8½
29	5	93	No Name...............B..	" 5	" 23	" 24	" 11	7	6¼	6	9½	14	8¼
30	5	115	Bubach... . ...P..	" 5	" 24	" 27	" 14	7	7¼	5	5½	14	8
31	5	48	Parker Earle..........B..	" 2	" 24	" 27	" 18	9	6½	10	0¾	14	6
32	5	81	Williams ....B..	" 8	" 27	" 27	" 14	7	6½	7	5½	14	2¾
33	3	107	Marie.....................P..	" 5	" 28	" 29	" 14	6	7½	5	15¾	14	2¼
34	5	86	Clyde.....................B..	" 5	" 26	" 27	" 18	8	6½	7	0	14	0¼
35	5	28	Tennessee Prolific....B..	" 5	" 24	" 27	" 18	8	6½	12	1¼	13	15¼
36	5	98	Arkansas Traveller...B..	" 7	" 26	" 27	" 14	7	6	6	6	13	13
37	5	155	Crescent................P..	" 2	" 25	" 27	" 14	7	5	3	6	13	12
38	5	87	G. H. Caughell ....B..	" 2	" 21	" 24	" 14	7	5¾	6	15¾	13	5¼
39	2	5	Big Bobs .... B..	" 5	" 26	" 29	" 18	8	8	18	1½	13	1½
40	5	137	Bomba...................P..	" 5	" 26	" 27	" 14	8	5½	4	7¾	13	1
41	5	6	Mrs. Cleveland.......P..	" 7	" 25	" 27	" 18	8	7	16	15¼	13	1
42	3	4	Kansas ....P..	" 8	" 27	" 29	" 18	8	6¾	18	6	12	15
43	5	179	World's Champion....B..	" 7	" 26	" 27	" 14	7	5	2	7¼	12	9½
44	2	24	Success.............. B..	" 5	" 26	" 27	" 14	7	6½	12	6	12	9½
45	5	133	Dr. Arp..................P..	" 5	" 25	" 27	" 14	7	6	4	9	12	9
46	5	23	Morgan's Favorite. ..B..	" 5	" 25	" 27	" 18	8	7¾	12	8	12	7
47	5	22	Princess..... ....P..	" 5	" 21	" 24	" 18	10	5½	12	8	12	7
48	5	47	Boynton ....P..	" 5	" 23	" 24	" 14	9	5	10	1½	12	6
49	5	108	Kyle... ....B..	" 4	" 25	" 27	" 14	8	6¼	5	15	11	14½
50	5	95	Hood River............P..	" 5	" 24	" 27	" 14	7	7	6	8	11	13

COVER CROPS.

In recent years the English horse bean has proven valuable as a cover crop for holding the snow in winter as it is tall and does not break down much, but as no seed could be obtained it was not used this year. It was planned to grow horse beans and rape together this year as a cover crop, the former principally to hold the snow, and the latter for a bottom cover. As horse beans could not be obtained, rape was sown broadcast alone in part of the orchard on July 28, at the rate of 8 lbs. per acre, and when winter set in averaged 17 inches in height. It formed a dense cover, killing out practically all the weeds. Owing to the height to which it grew it should hold the snow well, and as leguminous crops have been used for the past nine years there should be sufficient nitrogen in the soil for some time. In another part of the orchard Hairy vetch, which had proven a very good cover crop, was sown in drills 28 inches apart on July 15. By winter it had made a perfect mat in most places, but had not made a strong enough growth to hold the snow well. The most satisfactory results are obtained from Hairy Vetch sown in drills when the seed is sown about the middle of June.

Work in determining the amount of moisture which different cover crops take from the soil was continued in the orchard this year by Mr. Frank T. Shutt, Chemist.

FUNGOUS DISEASES.

The Apple Spot fungus was not as bad as usual this year in most districts, but here and there it was very bad. In the orchards of the Experimental Farm, where spraying with Bordeaux mixture has been carried on regularly for the past thirteen or fourteen years, there is never any trouble with this disease, it being a rare sight to see any fruit spotted except among seedling trees which are not sprayed regularly; while there is good evidence to show that if the orchard trees were not sprayed the disease would soon spread.

Ripe Rot, Brown Rot, of the Plum:—This is one of the most difficult diseases to control. At the Central Experimental Farm it did considerable injury to Americana plums this year, notwithstanding thorough spraying. As this disease spreads by means of spores which germinate early in the spring and penetrate the twigs from the leaves and flower buds on which they alight, all the diseased plums which harbour myriads of these spores should be destroyed in the fall if practicable, but as this often cannot be done it will be seen how important it is to thoroughly spray the trees early in the spring before the spores, which are carried from this diseased fruit, germinate. The first spraying should be made shortly before the buds break with poisoned Bordeaux mixture or a sulphate of copper solution in the proportion of 1 lb. sulphate of copper to 25 gallons of water. A second spraying should be made with poisoned Bordeaux just before the blossoms open. These are two of the most important sprayings. The trees should be thoroughly sprayed again after blooming with poisoned Bordeaux, and again about two weeks before the fruit begins to colour. When the fruit begins to ripen they may be sprayed with the ammoniacal copper carbonate, which will not discolour the fruit, and which should destroy many of the spores which appear in great numbers on the mature fruit. As the disease spreads much more rapidly from fruit to fruit when they are touching each other, thinning is a good practice if for no other reason than to reduce this disease. Thorough spraying and thinning will lessen the injury from this disease very much.

Black Rot of the Grape:—While the black rot of the grape was not nearly so destructive this year as in 1904, and hence the results of spraying not so apparent, fruit growers should not neglect to spray their vineyards next year, as the disease may cause even greater loss than it did in 1904. The first spraying should be made with Bordeaux mixture just before blossoming; the second just after the fruit has set, and the third and fourth at intervals of about a week. There should then be three sprayings with ammoniacal copper carbonate.

SPRAYING AND SPRAYING MIXTURES.

The practice of spraying crops for the prevention of fungous diseases and insect pests is not growing in popularity as rapidly as the good results obtained would warrant, and notwithstanding the fact that year after year the advantages of spraying are impressed upon Canadian fruit growers from many sources. Spraying at the best, however, is an unpleasant operation and when the results are not always so apparent as killing potato beetles with Paris green, fruit growers are liable to get discouraged and decide to let spraying alone and take their chances. No greater mistake could be made. The good results from spraying to prevent injury from fungous diseases and injurious insects have been so frequently proven that spraying should be carried on by every fruit grower, just as he cultivates his field, in faith that good will result. Some years the results are not so pronounced as in others, but spraying is an insurance and the average results will well compensate for all the trouble and expense incurred. Thoroughness in spraying is, however, essential. A spraying calendar was published at the Central Experimental Farm this year which will be sent free to any one applying for it. This calendar gives information as to the time of spraying for the various diseases and insect pests affecting orchard and garden crops, and the formulas for preparing the different fungicides and insecticides recommended, and this will be found most useful for reference.

SODA BORDEAUX (BURGUNDY MIXTURE).

The Soda Bordeaux, or Burgundy Mixture as it is known in Great Britain, is made with carbonate of soda or washing soda instead of lime for neutralizing the sulphate of copper. Owing to the difficulty of getting lime in many places in the country, and because of the occasional clogging of nozzles by the lime when it has not been properly slacked or strained, considerable attention has been given in Canada of late to the Soda Bordeaux. Moreover, the experience of those who have used it in large quantities in the old country for several years for spraying potatoes is that if it is applied when freshly made it will adhere better than ordinary Bordeaux. At least one, and perhaps several Ontario fruit growers have been using the Soda Bordeaux successfully for several years in spraying apple trees for the prevention of Apple Spot fungus. It does not discolour the fruit as much as ordinary Bordeaux and is liked on this account.

It is not, however, recommended instead of Bordeaux mixture for spraying fruit trees, as sufficient evidence has not yet been obtained of its relative value.

During the past season several Canadian fruit growers used the Soda Bordeaux for the first time and with it Paris Green. Considerable injury to foliage resulted. The cause of this injury is explained by Mr. F. T. Shutt, Chemist, Experimental Farms, in the August number of the Canadian Horticulturist, where he writes:— 'When Paris green is mixed with ordinary Bordeaux it is not dissolved, but remains in suspension and experience has shown that no injury results from the use of such a spray. When, however, Paris green is added to Burgundy mixture it is partly dissolved by the excess of washing soda used in the preparation of the spray and a soluble arsenical compound formed which is more or less corrosive to foliage. It has long been known that soluble arsenical compounds have this injurious effect upon foliage, and consequently cannot be used in insecticidal mixtures.' In some experiments conducted by Mr. Shutt at the Central Experimental Farm, the details of which will be found in his annual report for this year, it was shown that injury to foliage resulted when arsenical poisons were used with the Burgundy mixture. It will, therefore, be readily seen that no arsenical poison should be used with Burgundy mixture for fruit trees.

In some potato experiments conducted during the past year we have not noticed any injury to the vines from the use of Paris green with the Burgundy mixture, although slight injury not detected, may have occurred. The formula for Soda Bordeaux mixture was published in the report of the Horticulturist for 1902. The following formula has been used with success for spraying potatoes for the prevention of blight and rot, although the results were not quite as good as with ordinary Bordeaux. The details of the results will be found among the potato experiments in this report.

SODA BORDEAUX (BURGUNDY MIXTURE) FOR POTATO BLLIGHT AND ROT.

Copper sulphate (bluestone)......	6 lbs.
Washing soda (carbonate of soda)....	7½ lbs.
Water (1 barrel)....	40 gallons.

Dissolve copper sulphate as for Bordeaux mixture. Dissolve washing soda in about 4 gallons of water. Pour the copper sulphate solution into a barrel, half fill the barrel with water, then stir in the solution of washing soda, and finally fill the barrel with water. It is now ready for use. The Soda Bordeaux adheres better to the foliage when freshly made than the ordinary Bordeaux mixture, but it deteriorates rapidly in this respect and must be used as soon as made. If left to stand for twenty-four hours it will have lost nearly all its adhesiveness. The Soda Bordeaux is not recommended in preference to the ordinary Bordeaux mixture, but where lime cannot be obtained it may be used with good results. Furthermore, on account of its freedom from gritty matter, there is less likelihood of the nozzles becoming clogged when it is used. As washing soda is considerably more expensive than lime, this mixture costs more than the ordinary Bordeaux mixture. If Soda Bordeaux is used for fruit trees it should be made in the proportion of copper sulphate, 4 lbs.; washing soda, 5 lbs., water (1 barrel), 40 gallons, but no arsenical poison should be used with it.

NEW FORMULAS FOR KEROSENE EMULSION.

Kerosene emulsion has for a number of years been one of the best remedies for sucking insects, but as it is somewhat troublesome to make, efforts have been made from time to time to find some other way in which kerosene could be safely used as an insecticide. As kerosene does not mix with water it is necessary to apply it in the form of an emulsion in order that it may be well distributed, and thus not cause injury to the tree.

In 1904 Prof. Close, of the Delaware Experiment Station, discovered that lime could be used instead of soap as an emulsifying agent. By mixing 1 lb. of limoid, or slaked lime, with 1 quart of kerosene and then diluting with water to the percentage desired and churning for five minutes by means of the liquid pumped through a coarse nozzle, an emulsion was formed which kept the kerosene in suspension for several weeks. He called this mixture the K-L Mixture, from the initial letters of kerosene and limoid. Limoid is a very fine preparation of lime manufactured in the United States and not obtainable in Canada. In order to learn if good lime, well slaked would not answer the same purpose, several experiments were planned and carried out in the chemical laboratory at the Central Experimental Farm in conjunction with Mr. F. T. Shutt, Chemist. The following results were obtained:—

1. Freshly slaked lime makes a smoother emulsion and one that stays in suspension longer than one made with ordinary air slaked lime; the latter, however, furnishes a satisfactory emulsion if it is not too much carbonated by long exposure to the air.

2. By using lime slaked immediately before mixing the quantity may be materially reduced. A perfect emulsion can be made by slaking ½ lb. of good quick lime and emulsifying with 1 quart of kerosene and 2 gallons of water.

A further advantage in using freshly slaked lime for orchard purposes lies in the fact that it more thoroughly whitens the trees than the emulsion made with the air-slaked lime. This enables the operator the easier to observe the degree of thoroughness with which the spraying is done.

3. By the use of freshly slaked lime less time is needed for the churning in order to bring the mass to a perfect emulsion. From three to five minutes will be found sufficient to make the emulsion.

4. It is not apparently a matter of much moment that the lime be dry and powdery when mixed with the kerosene. Excellent emulsions have been made both from the air-slaked and freshly slaked lime when they have been quite moist or even made into a thin cream with water before adding the kerosene.

FLOUR EMULSION.

While conducting the experiments already referred to, it was discovered by Mr. Shutt that flour could be successfully substituted for lime. It was found by experiment that 8 ounces of flour was sufficient to hold in suspension 1 quart of kerosene, and even 2 ounces would make a temporary emulsion for immediate use. If the flour were scalded before adding the kerosene 2 ounces were found sufficient to make an emulsion which would stay up for more than a week. The operation of making kerosene emulsion with flour is very simple. The kerosene is first poured into a dry pail or barrel, the flour is then added and the two stirred together. Water is now added to make the desired percentage and the emulsion is then made by churning vigorously for about four or five minutes. If made in the proportion of 1 quart kerosene to 2 gallons of water the emulsion will contain about 11 per cent of kerosene, which is a safe amount to use for most plants in summer. The flour emulsion is smooth, readily and easily atomized, and does not clog the nozzle. Although no free kerosene will appear for several days at least, any separation into layers may be readily overcome or remedied by simply stirring the mixture.

When the flour emulsion is used there is no noticeable whitening of the tree or foliage, which is an advantage where ornamental shrubs are to be treated and where the whitening of the foliage is objectionable, but this is a disadvantage, however, in spraying fruit trees where the thoroughness of the work is of prime importance, as when the flour emulsion is used one cannot so readily see if the work has been well done. The chief advantages of the flour emulsion are that it is easily made, and also can be used when good lime cannot be obtained. This flour emulsion may be added to Bordeaux mixture, and Bordeaux mixture and Paris green if desired.

Experiments conducted at the Central Experimental Farm this year to test the effect of the lime and flour kerosene emulsions were not conclusive, but the indications are that these emulsions are not so effective as the ordinary kerosene emulsion made with soap, the soap evidently playing an important part in the destruction of sucking insects.

In reply to a letter addressed to Mr. E. D. Smith, M.P., who had used the Kerosene Emulsion made with flour in fighting aphis on his nursery stock in 1905, the following letter was received:—

Dear Sir,—Yours to hand in regard to the kerosene emulsion with flour. It worked very well. We had no trouble when it was thoroughly agitated. We had no damage from the use of it, as we have had in previous years when made in the old way.

Yours truly,

E. D. SMITH.

VEGETABLES.

FARMERS' LIST OF BEST VEGETABLES.

The results of variety tests of vegetables for the past eighteen years are summarized in the following table, where a list is given of the varieties of each kind of vegetable which are considered the best to plant:

Asparagus.—Conover's Colossal is the best all round variety, but this is more subject to rust than Palmetto or Argenteuil.

Beans.—Keeney's Rustless Golden Wax or Wardwell's Kidney Wax, for early crop; Early Refugee, for medium; and Refugee or 1,000 to 1, for late crop, are the most satisfactory dwarf varieties. Asparagus, Lazy Wife and Old Homestead are three of the best pole varieties.

Beets.—Egyptian Turnip, Meteor and Eclipse are three of the best.

Borecole or Kale.—Dwarf Green Curled Scotch is the best.

Broccoli.—White Cape.

Brussels Sprouts.—Improved Dwarf is the most satisfactory.

Cabbage.—Early Jersey Wakefield (early), Succession (medium), Late Flat Dutch, Houser, Drumhead Savoy (late), Red Dutch (red), is a select list of the best varieties of cabbage. For extra early use, Paris Market is desirable, being a week earlier than Early Jersey Wakefield.

Cauliflowers.—Early Dwarf Erfurt and Early Snowball.

Carrots.—Chantenay is one of the best, but if a good extra early sort is required the Early Scarlet Horn can be planted with advantage. It is a small variety.

Celery.—Golden Self-Blanching (Paris Golden Yellow), Improved White Plume (early), Perfection Heartwell, White Triumph, London Red (late) are among the best.

Corn.—Early Fordhook, Early Cory (early), Crosby's Early, Golden Bantam, Henderson's Metropolitan (second early), Perry's Hybrid, Stabler's Early, Early Evergreen, and Black Mexican (medium), Stowel's Evergreen, Country Gentleman (late). In planting, the Country Gentleman should not be omitted, as it lengthens the season very considerably and is of fine quality.

Cucumbers.—Peerless White Spine or White Spine, Cool and Crisp, and Giant Pera are three of the most satisfactory slicing varieties. Boston Pickling is a good pickling sort.

Egg Plant.—New York improved and Long Purple succeed best.

Lettuce.—Black Seeded Simpson, The Morse, (early curled); New York, Giant Crystal Head, Crisp as Ice, and Improved Hanson (curled cabbage); Improved Salamandar, Tennis Ball (cabbage); Trianon and Paris (Cos lettuce).

Melons, Musk.—Long Island Beauty, Hackensack and Montreal Market, of the Nutmeg type; Surprise, Christiana and Emerald Gem, of the yellow fleshed types, are all good.

Melons, Water.—Cole's Early, Salzer's Earliest, Ice Cream, Phinney's Early are good early water melons.

Onions.—Yellow Globe Danvers and Large Red Wethersfield are two of the best onions in cultivation.

Parsnips.—Hollow Crown and Dobbie's Selected are both good sorts.

Parsley.—Doubled Curled is as good as any.

Peppers.—Cayenne, Chili and Cardinal, are three of the best.

Pease.—Gregory's Surprise, Thos. Laxton, Gradus, American Wonder, Premium Gem (early); McLean's Advancer, Nott's New Perfection, Heroine (medium). None of these are tall growing varieties. Stratagem, Juno (dwarf), Telephone (late). Excelsior is a promising second early sort.

Potatoes.—Extra early; Rochester Rose, Early Ohio, Early Andes (pink), Bovee, Burpee's Extra Early (pink and white), Snowball and Eureka Extra Early, (white); early; Early White Prize (white), Vick's Extra Early (pink and white). Main crop; Carman No. 1 (white), Money Maker (white), Burnaby Mammoth (pink and white), Late Puritan (white), Dreer's Standard (white).

Radishes.—Early; Scarlet White-tipped Turnip, Rosy Gem, French Breakfast, Red Rocket (red); Icicle (white); late: White Strasburg, Long White Vienna; winter: Long Black Spanish, Chinese Rose-coloured.

Rhubarb.—Linnaeus, Victoria.

Salsify.—Long White, Sandwich Island.

Spinach.—Victoria, Thickleaved.

Squash.—Early: White Bush Scalloped, Summer Crook Neck; late: Hubbard.

Tomatoes.—Early; Sparks' Earliana, Chalk's Early Jewel; Main crop: Brinton's Best, Trophy, Matchless (scarlet), Burpee's Climax, Autocrat (purplish pink).

There are many varieties of tomatoes which are almost equal in excellence and productiveness.

Turnips.—Early; Extra Early Milan, Red Top Strap Leaf.

Swedes.—Champion Purple Top, Skirving's Improved.

POTATOES.

Although the potato crop in some parts of the provinces of Ontario and Quebec was much reduced this year owing to Blight and Rot, the yields in the experimental plots were good, and there was little rot there. The thorough spraying with Bordeaux mixture which the vines received was undoubtedly the cause of such good results in an unfavourable season. In the uniform test plots the highest yield was obtained from the Dalmeny Beauty, a variety obtained from Scotland in 1904, which yielded at the rate of 475 bushels 12 lbs. per acre this year. This is an exception to most varieties from Great Britain, which usually give comparatively poor results here.

The potatoes were planted in good sandy loam soil on May 22. The previous crop was tobacco, which had been well manured. The soil was ploughed in the autumn and again in the spring after which it was disc harrowed twice, and harrowed once with the smoothing harrow. The drills were made 30 inches apart and about 4 inches deep with the double mould board plough. The sets, which had at least three good eyes, were dropped one foot apart in the drills. Sixty-six sets of each kind were planted and covered with the hoe. The land was harrowed before the potatoes appeared above ground in order to kill weeds, and then kept thoroughly cultivated as long as possible. Practically, level cultivation was practiced, although the soil was drawn slightly towards the plants. The vines were sprayed with Bordeaux mixture five times and with Paris green when necessary. The potatoes were dug on October 5. Last year new seed of the Carman No. 1 and Carman No. 3 potatoes were obtained from the introducers, J. M. Thorburn & Co., Philadelphia, to compare the yield with those from seed which had been grown at the Central Experimental Farm for the past nine seasons. The difference in yield last year in favour of the new seed of Carman No. 1, was at the rate of 66 bushels 36 lbs. per acre, and of Carman No. 3, 171 bushels 36 lbs. The crop from these strains was kept separate and planted again this year with somewhat similar results, the new seed of Carman No. 1 yielding at the rate of 92 bushels 24 lbs. more, and of Carman No. 3 at the rate of 66 bushels more per acre than the Experimental Farm seed. These results are very marked and indicate the benefits which are at least sometimes derived from a change of seed.

POTATOES—TEST OF VARIETIES.

Number.	Name of Variety.	Quality.	Total Yield per Acre.		Yield per Acre, Marketable.		Yield per Acre, Unmarketable.		Colour.
	Medium and Late Varieties.		Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	
1	Dalmeny Beauty	Good	475	12	426	48	48	24	White.
2	Rural Blush	"	462	..	431	12	30	48	Pink.
3	Ashleaf Kidney	"	435	36	396	..	39	36	White.
4	Manistee	Med. to g.	422	24	374	..	48	24	Bright pink.
5	Norcross	Good	418	..	391	36	26	24	White.
6	Carman No. 1 (New Seed, 1904)	"	413	36	369	36	44	..	"
7	Sabean's Elephant	"	404	48	360	48	44	..	"
8	Canadian Beauty	"	396	..	374	..	22	..	Pink and white.
9	I. X. L	"	396	..	3 5	12	30	48	"
10	Pearce	"	391	36	347	36	44	..	"
11	Ionia	Medium	382	48	347	36	35	12	White.
12	Clay Rose	"	378	24	334	24	44	..	Pink.
13	Morgan's Seedling	Good	374	..	343	12	30	48	Pink and white.
14	Empire State	"	369	36	338	48	30	48	White.
15	American Wonder	"	369	36	330	..	39	36	"
16	Seedling No. 7	Med. to p.	365	12	334	24	30	48	Bright pink.
17	Morgan's White	Medium	365	12	308	..	57	12	White.
18	Holborn Abundance	"	360	48	316	48	44	..	"
19	Dooley	Good	356	24	325	36	30	48	"
20	Delaware	"	356	24	316	48	39	36	"
21	Vermont Gold Coin	"	347	36	308	..	39	36	"
22	Carman No. 3 (New Seed, 1904)	"	343	12	325	36	17	36	"
23	Enormous	"	343	12	303	36	39	36	"
24	Dreer's Standard	"	334	24	308	..	26	24	"
25	Late Puritan	"	330	..	308	..	22	..	"
26	Uncle Sam	"	321	12	290	24	30	48	"
27	Carman No. 1	"	321	12	286	..	35	12	"
28	State of Maine	"	316	48	281	36	35	12	"
29	Burnaby Mammoth	"	316	48	272	48	44	..	Pink and white.
30	Empress Queen		308	..	228	48	79	12	
31	Money Maker	Good	299	12	228	48	70	24	White.
32	Rose No. 9	Medium	294	48	272	48	22	..	Pink.
33	Swiss Snowflake	Good	286	..	250	48	35	12	White.
34	American Giant	"	281	36	242	..	39	36	"
35	Doherty's Seedling	"	277	12	264	..	13	12	"
36	Carman No. 3	"	277	12	255	12	22	..	"
37	Vick's No. 9		277	12	242	..	35	12	"
38	White Albino	Good	277	12	224	24	52	48	"
39	Charles Fidler	"	272	48	246	24	26	24	"
40	Mammoth Pearl	"	264	..	250	48	13	12	"
41	Dr. Maerker	Medium	255	12	154	..	101	12	"
42	Cambridge Russet	Good	228	48	206	48	22	..	"
43	Evergood		228	48	162	48	66	..	"
44	Northern Star		224	24	154	..	70	24	"
45	Jubilee	Good	198	..	171	36	26	24	Pink and white.
46	Hibernia		193	36	110	..	83	36	Deep pink.
47	Malden's Recorder		17	36			17	36	White.

POTATOES—TEST OF VARIETIES.

Number.	Name of Variety.	Quality.	Total Yield per Acre.		Yield per Acre, Marketable.		Yield per Acre, Unmarketable.		Colour.
	Early Varieties.		Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	
1	Maule's Thoroughbred	Good	396	..	360	48	35	12	Pink.
2	Country Gentleman	″	382	48	347	36	35	12	″ and white.
3	Crine's Lightning	″	374	..	347	36	26	24	Red.
4	Rochester Rose	″	352	..	303	36	48	24	Pink.
5	Reeve's Rose	″	343	12	308	..	35	12	″
6	Vick's Extra Early	″	338	48	312	24	26	24	″ and white.
7	Early Carter	″	321	12	290	24	30	48	White.
8	Early Rose	″	294	48	259	36	35	12	Pink.
9	Clarke's Pride	″	290	24	242	..	48	24	White.
10	Everett	″	290	24	242	..	48	24	Pink.
11	Irish Cobbler	″	290	24	242	..	48	24	White.
12	Daybreak	....	290	24	233	12	57	12	Pink.
13	Quick Crop	Good	286	..	250	48	35	12	″ and white.
14	Rawdon Rose	....	281	36	255	12	26	24	″ ″
15	Penn Manor	Good	281	36	250	48	30	48	″ ″
16	Early White Prize	″	272	48	242	..	30	48	″ ″
17	Peck's Early	....	268	24	242	..	26	24	Pink.
18	Pingree	....	268	24	220	..	48	24	White.
19	Early Sunlight	....	268	24	215	36	52	48	″
20	Northern Beauty	....	264	..	228	48	35	12	Pink.
21	Early Johnston	....	259	36	224	24	35	12	Pale pink.
22	Bovee	Good	250	48	176	..	74	48	Pink and white.
23	Early Elkinah	″	246	24	224	24	22	..	Pink.
24	Early Ohio	″	246	24	220	..	26	24	″
25	Early Andes	″	246	24	220	..	26	24	″
26	Eureka Extra Early	″	242	..	176	..	66	..	White.
27	Snowball	″	224	24	198	..	26	24	″
28	Early Superior	....	211	12	162	48	48	24	Pink.
29	Early St. George	Good	198	..	162	48	35	12	″ and white.
30	Burpee's Extra Early	″	176	..	132	..	44	..	″ ″
31	Early Envoy	....	162	48	132	..	30	48	″ ″
32	Van Orman's Earliest	....	114	24	83	36	30	48	Bright pink.

TWELVE BEST YIELDING POTATOES—AVERAGE OF FIVE YEARS, 1901-05.

Number.	Name of Variety.	Number of Years under Test.	Season.	Colour.	Quality.	Average Yield per Acre, 1901 to 1905.	
						Bush.	Lbs.
1	Dr. Maerker	7	Very late	White	Medium to good.	456	43
2	Late Puritan	12	Late	″	Good	452	46
3	Carman No. 1	11	Medium late.	″	″	447	55
4	Money Maker	11	Medium	″	″	439	7
5	Rural Blush	17	Late	Pink and reddish	″	438	14
6	Dreer's Standard	12	″	White	″	434	17
7	*Burnaby Mammoth	13	Medium	Pink and white	″	427	41
8	Pearce	6	″	″ ″	″	425	2
9	I. X. L	13	″	″ ″	″	422	50
10	Canadian Beauty	8	″	″ ″	″	422	24
11	Clay Rose	11	Late	Deep pink	Medium	420	38
12	Sabean's Elephant	11	″	White	Good	418	..

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* This variety was first grown under the name of Burnaby Seedling, and then procured under the name of Burnaby Mammoth. The average yield given is from the new strain for two years, and the old one for three years.

Smaller plots of potatoes.—This year a much larger number of varieties than usual was tested for the first time. A number of these was imported from Great Britain, but in most cases those from this source did not yield nearly as well as those from Canada or the United States. Our season is apparently too short for most of the varieties from Great Britain. Some of the new varieties were tested in the uniform test plots, but the following 44 sorts were grown in smaller plots. Of these, three were new strains of old varieties obtained from the Ontario Agricultural College, Guelph.

POTATOES—YIELDS FROM SMALLER PLOTS.

Number.	Name of Variety.	Number of Sets Planted.	Total Yield per Acre.		Yield per Acre Marketable.		Yield per Acre Unmarketable.	
			Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.
1	Harris Snowball	8	562	39	544	30	18	9
2	Snider Best Early	8	544	30	490	3	54	27
3	L. A. Sovereign, Round Plains, Man	4	508	12	471	54	36	18
4	Merrill	8	526	21	508	12	18	9
5	Early Pride	33	475	12	378	24	96	48
6	Hard to Beat	16	471	53	381	9	90	45
7	Potentate	16	453	45	381	9	72	36
8	Early May	16	435	36	363	..	72	36
9	Woltman	33	431	12	352	..	79	12
10	Star of the East	8	417	27	399	18	18	9
11	Fantail Rose	33	413	36	343	12	70	24
12	Pearl of Savoy (O.A.C.)	16	381	9	344	51	36	18
13	Empire State (O.A.C.)	16	381	8	299	28	81	48
14	Wee MacGregor	33	378	24	343	12	35	12
15	White Mammoth	16	363	..	308	33	54	27
16	Early Trumbull	16	363	..	326	42	36	18
17	Early Bird	8	363	..	326	42	36	18
18	Uncle Gideon's Quick Lunch	8	363	..	290	24	72	36
19	Naught Six	16	363	..	272	15	90	45
20	Early Excelsior	16	353	55	335	46	18	9
21	Washington	16	353	55	317	37	36	18
22	Noroton Beauty	8	326	42	290	24	36	18
23	Million Dollar	16	326	41	317	37	9	4
24	American Wonder (O.A.C.)	16	326	32	299	19	27	13
25	New Reliance	16	317	37	254	6	63	31
26	Standard	16	299	28	245	1	54	27
27	Burpee's Extra Early (Burpee)	33	295	12	246	24	52	48
28	Babbit	8	290	24	217	48	72	36
29	New Climax	16	272	14	190	34	81	40
30	Canadian Red	16	271	45	235	27	36	18
31	Sutton's Sion House	16	254	6	199	39	54	27
32	Dewey	16	245	1	217	48	27	13
33	The Scot	12	242	..	193	36	48	24
34	Duke of York	16	199	39	145	12	54	27
35	Early Hero	16	181	30	145	12	36	18
36	Vicktor	16	163	21	145	12	18	9
37	Peacemaker	16	163	21	127	3	36	18
38	Eightyfold	33	136	24	114	24	22	..
39	Ninetyfold	16	136	7	90	45	45	12
40	Snowdrop	33	114	24	70	24	44	..
41	Pride of Tonbridge	33	105	36	79	12	26	24
42	Sir John Llewellyn	33	88	..	61	36	26	24
43	Sharpe's Victor	33	70	24	..	..	70	24
44	Myatt's Ashleaf	33	52	48	..	..	52	48

POTATOES—TEST OF RESISTANCE TO BLIGHT.

An experiment was conducted this year to determine which varieties of potatoes were freest from blight, and which of those freest from blight would prove most productive. The potatoes were planted side by side on May 27 in sandy loam soil, 33 sets of each kind being used. The plants were sprayed with Paris green to protect them from the potato beetle, but no Bordeaux mixture was used. Level cultivation was adopted. The kinds planted were those which in previous years had shown themselves freest from blight, but a few less resistant varieties were used with the object of giving the disease a foothold. Thirty-two varieties were planted. The Holborn Abundance, which has been grown at the Central Experimental Farm for the past seventeen years, proved to be the most blight resistant as well as one of the most productive. It yielded at the rate of 316 bushels 48 lbs. per acre. About equally as resistant to blight but much lower in yield were: June, 189 bushels 12 lbs. per acre; Rust Proof, 118 bushels 48 lbs. per acre; Sutton's Discovery, 66 bushels per acre. Almost equally resistant were Clay Rose, 215 bushels 36 lbs. per acre; Rural Blush, 206 bushels 48 lbs. per acre, and Dr. Maerker, 158 bushels 24 lbs. per acre, and State of Maine, 149 bushels 36 lbs. per acre. The dates when the tops showed the first signs of disease; when the leaves were dead; and when the stems were dead, were all noted and the yield per acre recorded of all the varieties tested.

The disease did eventually attack the foliage of those most resistant and as these are all late varieties some of them did not yield as much as other earlier kinds a little less resistant. The disease developed early this year, which accounts, no doubt, for the fact that the yields from some of the most blight resistant but latest varieties were comparatively small. It is evident that a variety can be so late in season that it will not resist blight long enough for a crop to be developed which will equal a variety a little earlier in season though apparently not so resistant. The potatoes from the best hills of the most blight resistant varieties were saved for the purpose of continuing this test in the hope that by careful selection more productive and more blight resistant strains will be developed.

Spraying Potatoes to Prevent Blight and Rot.—The prevalence of blight and rot in the provinces of Ontario and Quebec this year will, it is hoped, draw the attention of farmers more than it has done in the past to the value of Bordeaux mixture in preventing this disease. During the past fourteen years experiments have been conducted at the Central Experimental Farm with the object of testing different remedies, but up to the present time nothing has proven as satisfactory as Bordeaux mixture. An estimate of the cost of applying Bordeaux mixture has been given in previous reports and in a bulletin on potato culture published this year. Briefly stated, it may be said that the cost of four applications per acre was estimated at $5.52. As this estimate was based on comparatively small plots it would be somewhat reduced on large areas. As the disease may make its appearance any time during the latter part of July, it has been found to be the best practice to spray about the middle of July, or even before, if one has to spray for the potato beetle about that time. The formula recommended is: 6 lbs. bluestone, 4 lbs. lime, 40 gallons water.

Following are the results obtained from the use of Bordeaux mixture, including this year. It will be seen that the average increase from spraying for four years is at the rate of 92 bushels 31 lbs. per acre. At 40c. a bushel this would mean an average net profit per acre from the use of Bordeaux mixture of about $30, deducting the cost of application.

—	1901.		1902.		1904.		1905.		1901-2-4-5.	
	Average yield per acre of Marketable Potatoes—Sprayed four times and unsprayed.		Average yield per acre of Marketable Potatoes—Sprayed four times and unsprayed.		Average yield per acre of Marketable Potatoes—Sprayed five times and unsprayed.		Average yield per acre of Marketable Potatoes—Sprayed five times and unsprayed.		Average yield per acre of Marketable Potatoes (Four Years)—Sprayed and unsprayed.	
	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.
Sprayed	333	43	310	12	369	21	228	4	310	20
Unsprayed......	233	11	189	54	306	39	141	32	217	49
Average increase in yield per acre of Marketable Potatoes from spraying with Bordeaux mixture....	100	32	120	18	62	42	86	32	92	31

POTATO SPRAYING EXPERIMENTS, 1905.

This year five comparative experiments were made, there being eighteen varieties in each test. The potatoes were planted on May 26, 33 sets of each variety being used. Level cultivation was adopted. The figures given are the averages of the eighteen kinds tested. This experiment was practically the same as was conducted in 1904, and in the report for that year fuller details are given regarding the different formulas and the relative cost of application. The Bordeaux mixture, Soda Bordeaux, and Bordeaux mixture and Bug Death were each applied five times. With the two first, Paris green was added when necessary. Where Bug Death alone was used it was applied twice dry and four times with water.

Average Yield per Acre Marketable Potatoes, 1905 (18 varieties).

	Bush.	*Lbs.*
Bordeaux mixture and Paris green....	228	4
Soda Bordeaux and Paris green....	211	27
Bordeaux mixture and Bug Death....	182	7
Paris green only....	141	32
Bug Death......	107	33

TOMATOES—TEST OF VARIETIES.

The tomato is such a popular vegetable that it has received much attention in the horticultural department. Practically all the varieties which have been offered for sale have been tested during recent years, the greater part of which have now been discarded, although 54 sorts were tested this year.

The Bright and Early, which heads the list for productiveness this year, has nearly always been one of the most productive. It is, however, too small for commercial purposes, but where weight of crop is the chief consideration this should prove a very valuable variety. It is smooth, regular in shape and of an attractive scarlet colour, but is below medium to small in size. The main crop varieties, which have averaged best in productiveness in the past and which are of good shape, are: Brinton's Best, Trophy, and Matchless (scarlet); and Burpee's Climax and Autocrat (purplish pink). The Marvel, one of the newer scarlet main crop varieties, is a very fine sort.

Among early varieties, Sparks' Earliana continues to take first place. It is the earliest smooth scarlet tomato which has been tested. In the table containing the list of earliest varieties for 1905, it will be noticed that Sparks' Earliana (C.E.F.) gave by far the largest weight of early ripe fruit. This was from seed selected for the two previous years from the earliest ripening fruits of this variety at the Central Experimental Farm, and shows the importance of selecting and saving one's own seed when possible. In this instance the plants from the C. E. F. seed produced more than twice as much early fruit as that from imported seed. In addition to the six earliest tomatoes for 1905, the Dominion Day, Frogmore Selected, and Chalk's Early Jewel are three early varieties which produced more fruit up to August 10 than those in the table of earliest. The reason they were not included is that they did not produce as much ripe fruit before August 10 as some of the others, and hence could not be considered quite as early. The Dominion Day and Chalk's Early Jewel were, however, among the earliest six in 1904.

Owing to the cloudy, showery and comparatively cool summer the yields are not as large as they have been in more favourable seasons. The seed was sown in hotbeds on March 29, and the plants pricked out into strawberry boxes on April 25, and kept in a cold frame until June 7, when they were planted in the open air. They were planted four feet apart each way and five plants of each variety were used. The soil was a light sandy loam. The soil was kept cultivated until the plants covered the ground. The plants were not pruned or trained in any way in the test of varieties.

TOMATOES—TWELVE BEST YIELDING VARIETIES, 1905.

Name of Variety.	Date of first Ripe Fruit, 1905.		Yield of Ripe Fruit to Aug. 10, 1905, 5 plants.		Yield of Ripe Fruit per acre to Aug. 10, 1905.		Total Yield of Ripe Fruit, 5 Plants — All pickings, 1905.		Total Yield of Ripe Fruit per plant, 1905.		Remarks.
			Lbs.	Ozs.	Lbs.	Ozs.	Lbs.	Ozs.	Lbs.	Ozs.	
Bright aad Early	July	27	4	12	2,586	6	64	12	12	15	Below medium size, regular, smooth, scarlet.
King Humbert	Aug.	2	5	..	2,722	8	57	4	11	7	Below medium size, pear shaped, scarlet.
Nolte's Earliest (C.E.F.)	July	26	10	12	5,853	6	55	4	11	1	Medium size, wrinkled, scarlet.
Thorburn's Earliest	Aug.	7	2	..	1,089	..	53	12	10	12	Medium size, almost smooth, scarlet.
Nolte's Earliest	July	25	6	12	3,675	6	51	8	10	5	Medium size, wrinkled, scarlet.
Bond's Early Minnesota	Aug.	5	3	..	1,633	8	50	8	10	2	Below medium size, smooth, regular, purplish pink.
Dominion Day	July	24	13	4	7,214	10	50	4	10	1	Medium size, wrinkled, scarlet.
Chalk's Early Jewel	Aug.	1	8	..	4,356	..	50	..	10	..	Medium size, smooth, regular, scarlet.
The Marvel.	"	2	2	12	1,497	6	49	..	9	13	Medium size, smooth, very regular, scarlet, handsome.
Democrat	"	7	3	..	1,633	8	47	8	9	8	Above medium size, smooth, purplish pink.
Freedom	July	26	2	8	1,361	4	47	8	9	8	Below medium to medium size, regular, smooth, scarlet.
Frogmore Selected	"	28	8	12	4,764	6	44	..	8	13	Below medium size, smooth, scarlet.
*Sparks' Earliana (C.E.F)	"	24	18	8	10,073	4	43	..	8	10	Medium size, smooth, scarlet.

TOMATOES—SIX EARLIEST VARIETIES, 1905.

Sparks' Earliana (C.E.F)	July	24	18	8	10,073	4	43	..	8	10	Medium size, smooth, scarlet.
Maule's Earliest	"	26	10	8	5,717	4	38	8	7	11	Medium size, smooth to wrinkled, scarlet.
Money Maker	"	25	7	..	3,811	8	32	4	6	7	Medium size, wrinkled, scarlet.
Sparks' Earliana	"	27	7	..	3,811	8	39	..	7	13	Medium size, smooth, scarlet.
Early Ruby.	"	24	6	12	3,675	6	23	12	4	12	Medium size, smooth to wrinkled, scarlet.
Quicksure	"	18	5	7	2,960	11	37	15	7	9	Medium size, wrinkled, scarlet.
Conqueror	"	26	4	..	2,178	..	26	8	5	5	Medium size, almost smooth scarlet.

* NOTE.—Imported seed of Sparks' Earliana yielded 39 lbs. ripe fruit of which only 7 lbs. matured, by Aug. 10.

TOMATOES—EXPERIMENTS IN PRUNING.

In the annual report for 1904, the results of an experiment in a certain method of pruning tomato plants were published. The experiment was continued during the past season. The seed was sown on March 10, and the plants pricked out on March 30; and transplanted again into strawberry boxes on April 19. As soon as the plants in the hotbeds had six strong leaves on them, which was on May 2 in 1905, the tops were nipped off and the plants given more room, being placed 5½ inches apart. The object of pinching off the tops of the plant was to cause new shoots to develop at the axils of the leaves in order to have six branches bearing tomatoes instead of the one cluster usually found at the top of the plant. These were planted out on June 7 alongside other plants unpruned. On July 4 half of the pruned plants were again pruned, all laterals being taken out, and the six main branches only being left. This left 20 plants for each system. The further advanced the axillary shoots are when the plants are set out the larger the early crop is likely to be. In the following table will be found the results of the experiment with Sparks' Earliana for the years 1904 and 1905, and of Chalk's Early Jewel for 1905. It will be seen that there is considerable advantage in pruning by this method.

Name of Variety.	Date of First Ripe Fruit, 1904.	Date of First Ripe Fruit, 1905.	Ripe Fruit First Three Pickings, 1904.		Ripe Fruit First Three Pickings, 1905.		Total Yield of Ripe Fruit, 1904.		Total Yield of Ripe Fruit, 1905.	
			Lbs.	Ozs.	Lbs.	Ozs.	Lbs.	Ozs.	Lbs.	Ozs.
Sparks' Earliana :										
Unpruned	July 23	July 18	9	..	5	4	84	..	182	4
Pruned once	Aug. 13	July 25	6	..	11	..	137	10	212	..
Pruned twice	Aug. 12	July 25	18	..	16	8	132	13	134	8
Chalk's Early Jewel :										..
Unpruned	..	July 16			5	3			240	11
Pruned once		July 29			1	..			256	..
Pruned twice		July 29			2	12			173	12

While the unpruned plants produced the earliest fruit, in the case of the Sparks' Earliana, the yield from the pruned plants for the first three pickings in 1904 was, from the plants pruned twice, double the crop from those not pruned; and in 1905 more than three times from those pruned once (merely nipped off at top) than from those not pruned. The Chalk's Early Jewel, which is not quite so early, did not show such an advantage. The first three pickings represented the crop up to August 4. On August 10 the crop of ripe fruit up to that date from the unpruned Sparks' Earliana was 17 lbs. 4 ounces; from plants pruned once, 56 lbs., and from plants pruned twice, 64 lbs. 8 ounces, showing nearly four times as great a yield from the pruned as from the unpruned. The difference in the Chalk's Early Jewel was even greater. On August 10 the crop of ripe fruit from the unpruned up to that date was 13 lbs. 3 ounces; from plants pruned once, or simply headed back, 41 lbs., from plants pruned twice, 58 lbs. 4 ounces. This year the price of tomatoes was still high on August 10, and hence good returns would have been had from pruning. From the experience of 1904 and 1905 it would appear that the most early fruit is obtained when the plants are headed back before planting out and pruned once after planting.

TOBACCO.

The variety test of tobacco was continued this year and 49 varieties were grown. A few of the kinds which had done well in previous years were grown in larger areas, and following will be found a table giving the names of the varieties and the yields obtained from each. The tobacco seed was sown in a hotbed on April 8, the young plants transplanted to a cold frame on May 18, and set out in the open 3 by 3½ feet apart on June 8. The soil was sandy loam which had been well manured with rotted barnyard manure. There was a hailstorm during the growing season which did much injury to the leaves and lessened the quantity of first grade tobacco. The plants were cut on September 14 and taken to the curing house. The tobacco was stripped during the latter part of November and early in December, and experiments in fermentation have been planned.

Name of Variety.	Number of Plants.	Weight of 1st Grade.		Weight of 2nd Grade.		Weight of 3rd Grade.		Total Yield per Acre all Grades.		Condition when cut, Sept. 15.
		Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	
Long Leaf Gooch	265	53	..	......	......	12	..	1017	9	Near ripe.
Little Oronoka	326	44	..	2	..	11	..	725	6	Ripe.
Havana	416	19	..	8	..	19	..	458	12	"
Connecticut Seed Leaf	383	75	..	24	8	37	..	1478	9	Near ripe.
Improved White Burley	250	34	..	2	..	7	..	713	9	" "
Kentucky Burley	585	109	..	52	..	42	..	1439	9	" "
Lacks	280	55	..	4	..	10	..	1022	5	Ripe.

ARBORETUM AND BOTANIC GARDEN.

The winter of 1904-5 was a favourable one for trees, shrubs, and herbaceous plants, as there were no very low temperatures and there was a good covering of snow, hence there was no special injury to plants this year, although there was the usual killing back of the half hardy and tender species. The summer season was a favourable one for growth and most of the specimens did well this year. There were 263 species and varieties of trees and shrubs planted in the spring of 1905, and when the records were completed in the autumn it was found that there was a total of 3,229 species and varieties of trees and shrubs living in the Arboretum represented by 5,010 specimens. Among the interesting things planted this year may be mentioned a fine collection of Cratægus donated by the Arnold Arboretum.

The herbaceous borders looked well this year, and additions were made to the collection there, making a total of 2,041 species and varieties of herbaceous perennials living in the autumn of 1905. There are, without doubt, some synonyms among the trees and shrubs, as well as the perennials, not yet identified, but the number of these is not large.

Following is a record of the information which has been published in previous reports regarding plants in the Arboretum and Botanic garden:—

In 1899 a catalogue of the trees and shrubs in the Arboretum which had been tested up to that time was published conjointly by Dr. Wm. Saunders and the writer. In this catalogue the scientific names of the trees and shrubs are arranged alphabetically, and when a species or variety has a common name this is also given. The countries are named of which the trees and shrubs are native, also the year in which they are planted. Notes on the hardiness of the specimens were published in this bulletin.

In the annual report of the writer for 1897 a descriptive list was published of what was considered 'the best one hundred hardy ornamental trees and shrubs,' and 'the best one hundred herbaceous perennials.' This list has proven very useful to many persons. In the writer's report for 1898 a short 'Additional list of Herbaceous Perennials' is given. In the report for 1899 another short descriptive 'List of Additional Good Perennials,' and a descriptive list of 'The Best Low Growing Flowering Shrubs.' The report for 1900 contains 'Descriptive Lists of the Best Woody and Annual Climbers,' and that for 1901 'A Descriptive List of the Different Species and Best Varieties of Lilacs.' In 1902 was published 'A List of Best Spring Flowering Perennials,' in 1903 a list of 'Deciduous Trees, Shrubs and Climbers with Attractive Foliage, Bark and Fruit,' in 1904 'A List of the Genera in the Arboretum with the Number of Species of each Genus.'

REPORT OF THE CHEMIST.

(Frank T. Shutt, M.A., F.I.C., F.C.S., F.R.S.C.)

Ottawa, December 1, 1905.

Dr. Wm. Saunders, C.M.G.,
Director, Dominion Experimental Farms,
Ottawa.

Sir,—I have the honour to submit herewith the nineteenth annual report of the Chemical Division of the Experimental Farms.

Investigations have been carried on during the past year in all the more important branches of agriculture, and many problems in connection with dairying, fruit growing, grain growing, cattle feeding, &c., have received our attention.

Soils.—We are able to present data of an important character regarding the accumulation of nitrogen in the soil through the growth and turning under of clover. The results were obtained by the analysis of certain soils before and after the growth of clover, the period of the experiment extending over two seasons. In former years we have determined the fertilizing influence of the legumes by estimating the nitrogen they contained and by the increase of yield in the crop succeeding them. The method employed in the work now reported on is more direct and attacks the problem from another standpoint. It is a matter of interest to note that the results from all three methods practically agree, thus furnishing evidence of a most complete and satisfactory nature respecting this economic means of soil improvement.

The study of the various factors by which the soil's moisture may be controlled has been continued, the experiments being conducted, as during 1904, on the Experimental Farm at Ottawa, Ont., and Nappan, N.S. The object of the investigation has been to obtain information that would be of assistance in the rational management of orchard soils. Though the results here, owing to a somewhat heavy rainfall, do not show the necessity of cultivation, the experiments at Nappan clearly demonstrate the injurious effect of a grain crop in the orchard and also indicate the benefit to be derived from the dry earth mulch, in localities in which a limited precipitation prevails.

Closely associated with the growth of the legumes for soil enrichment is the question of inoculation: Is it necessary to inoculate the soil or the seed in order to obtain the best results with clover and Alfalfa? We discussed this subject at length in last year's report, stating our position regarding the practical value of cultures. This season we continued the research, using cultures kindly supplied by the Bureau of Plant Industry, Washington, D.C., and the Ontario Agricultural College, Guelph, Ont. Though on the whole the results are more favourable than those obtained in 1904, I doubt very much if they should be construed as indicating that any general benefit would be derived from cultures in districts in which clover and Alfalfa have already flourished.

Chemistry of Insecticides and Fungicides.—Under this heading will be found chapters on several interesting investigations relating to sprays and mixtures used in the destruction of insect and fungus pests, as follows:—

(*a*) An account of Soda-Bordeaux and the injury to fruit trees that may result from the addition thereto of Paris green.

(*b*) A discussion of some new forms of Kerosene Emulsion, including a review of the so-called lime emulsions, and a description of certain emulsions in which flour was substituted for lime. The lime emulsions were first proposed and made by Professor Close, of the Delaware Experiment Station, and we found them fairly stable, homogeneous, easy to spray and not clogging the nozzle. The flour emulsions, suggested by the writer, were also shown to answer equally well, if required for immediate use.

(*c*) The action of solutions of Formalin on the vitality of wheat has been ascertained and the strength of certain brands of Formalin has also been determined. The large quantity of this chemical now used in the North-west in the treatment of grain for the prevention of smut makes the information now given timely and valuable.

(*d*) The relative efficiency of certain cyanides, used in the production of hydrocyanic acid for the fumigation of trees and shrubs for the destruction of the San José scale is given.

Fodders and Feeding Stuffs.—In addition to the tabulation and discussion of a number of analyses of concentrated feeding stuffs and condimental foods made during the past year, we present the results of the examination of the chief field roots, and show that marked differences in feeding value may occur. The influence of heredity or 'breed' is also shown by examples of two well known varieties of mangels.

Sugar Beets.—Three varieties usually grown for factory purposes, Vilmorin's Improved, Klein Wanzleben, and Très Riche, as grown on the Dominion Experimental Farms during the past season have been analysed as to their sugar content.

Well Waters.—One hundred and sixteen samples of water from farm homesteads have been received. The tabulated results from 83 of these are given, together with a short report on their quality from the sanitary standpoint.

Samples Received from Farmers.—The number of these continues to increase. A large proportion of them have been examined and reported upon. This very useful branch of our work, though affording very little material for the annual report, is one, I believe, of immense value to the farming community. It certainly entails a large amount of labour, but as it is distinctly educative and helpful in character, it must receive attention, though at times it undoubtedly interferes with the research work in progress. If, however, all branches of the work of the Chemical Division are to be maintained, further laboratory assistance will be necessary.

The following table states the number of samples received, their nature, the province from which they come, and those still awaiting examination.

SAMPLES RECEIVED FOR EXAMINATION AND REPORT NOVEMBER 30, 1904, TO DECEMBER 1, 1905.

Sample.	British Columbia.	Alberta.	Saskatchewan.	Manitoba.	Ontario.	Quebec.	New Bruuswick.	Nova Scotia.	Prince Edward Island.	Total.	Number still awaiting examination.
Soils	29	27	19	6	52	9	1	62	2	207	60
Muds, mucks and marls	3	......	......	.	......	2	4	6	1	16	7
Manure and fertilizers	......	....	.....	3	11	6	......	11	......	31	3
Forage plants and fodders	13	10	7	5	165	11	10	9	......	230	36
Well waters	7	6	12	8	52	15	9	3	4	116	0
Miscellaneous, including dairy products, fungicides and insecticides	2	9	1	7	27	25	6	4	2	83	7
Totals	54	52	39	29	307	68	30	95	9	683	113

Investigations Relating to Dairying.—These include the examination of milk preserved by hydrogen peroxide as received from Denmark (the Budde method), the analysis of a milk powder prepared from whey, an inquiry into the volatile acid content of two-year-old cheese, and several other matters of more or less interest. The reports of these investigations are published in Bulletin No. 8, Dairy Series, May, 1905.

Grades of Wheat.—In conjunction with the Cereal Division, an investigation to determine the value of the various grades of wheat (Manitoba Inspection Division) was undertaken in the early months of the present year. The results are presented, together with those from the Cereal Division, in Bulletin No. 50 of the Experimental Farms Series.

The Winter Care of Manure.—This series of experiments was planned to ascertain the losses of plant food that may take place from December to April when manure is piled in large and small heaps, respectively. We are not reporting on the results this year, as it seems desirable to confirm the data by further trials.

Correspondence.—From November 30, 1904, to December 1, 1905, the letters directed to this division, in addition to those referred to us by the other departments of the farms, numbered 1,531; those sent out, 1,441.

Acknowledgments.—The investigations and analyses undertaken by the Division have satisfactorily progressed, due chiefly to the painstaking and excellent work of the Assistant Chemists, Mr. A. T. Charron, M.A., and Mr. H. W. Charlton, B.A.Sc. My thanks are due to them for most valuable aid in carrying out the various researches here reported on.

Mr. Charron, in addition to his duties here, has delivered a number of lectures on agricultural topics at Farmers' Institute Meetings, spending a month in the province of Quebec, and another month in New Brunswick. In all, more than 60 addresses were given.

Mr. J. F. Watson has continued to discharge his duties in connection with the secretarial work of the division and has earned my thanks for the thorough and careful manner in which everything entrusted to him has been done.

I have the honour to be, sir,
Your obedient servant,
FRANK T. SHUTT,
Chemist, Dominion Experimental Farms.

THE NITROGEN-ENRICHMENT OF SOILS THROUGH THE GROWTH OF LEGUMES.

Many analyses of exhausted or, more correctly speaking, partially exhausted soils from cultivated areas have shown unmistakably that in the majority of cases the soil's constituents that have more particularly been dissipated through successive cropping and poor farming are organic matter (humus) and its concomitant, nitrogen. Again, it has almost invariably been found that our virgin soils of great productiveness are well supplied with these constituents and that accompanying them there is a goodly proportion of the mineral elements of plant food in readily assimilable forms.

As an illustration of the effect of continuous cropping and cultivation, without manure of any kind, on the soil's nitrogen-content, the following cases may be cited: During the past season samples of soils—virgin and cultivated, and from closely adjacent areas—were collected in the North-west Territories and analysed. The results show a marked decrease in the percentage of nitrogen in the cultivated lands. One series may suffice. Regarding the cultivated soil, we possess a complete and authenticated record of the cropping and fallowing since the prairie was first broken, 22 years ago. It had borne six crops of wheat, 4 of barley, and 3 of oats, with fallows (9 in all) between each crop since 1887. No manure had ever been applied. The sample of virgin soil for comparison was taken from an adjacent area that had never been cultivated, the point of collection being about 120 feet distant from where the cultivated soil sample was taken. Both samples were of a composite character and every precaution taken to have them thoroughly representative. It may, further, be added that there is every reason to suppose that the soil over the whole area examined was originally of an extremely uniform nature; in other words, that at the outset the nitrogen content was practically the same for the soils now designated as virgin and cultivated respectively. The results of the investigation are given in the following table:—

Nitrogen.

	Per cent.	*Lbs. per acre.*
Virgin soil to a depth of 4 inches	·409	3,824
Cultivated soil to a depth of 4 inches	·257	2,402
Difference, or loss due to cropping and cultural operations	·152	1,422
Virgin soil, to a depth of 8 inches	·371	6,936
Cultivated soil to a depth of 8 inches	·253	4,730
Difference, or loss due to cropping and cultural operations	·118	2,206

Though in all probability the virgin soil has gained somewhat in nitrogen during the period of 22 years, for that is the tendency with soils in sod, the increase could not have been such as to materially affect the deduction that a very considerable depletion of soil nitrogen has followed the practice of continued cropping with grain and fallowing. The results show that the cultivated soil is to-day still very rich, yet compared with the untouched prairie it is seen to have lost one-third, practically, of its nitrogen. This is highly significant. Humus and nitrogen must be returned, either as manure or by the occasional growth of certain enriching crops, or fertility will inevitably decline. The productiveness of many of our soils is due largely to the accumulation of centuries, but these stores of plant food may be and are in many places being unduly dissipated through irrational methods and with even our best soils it cannot be many decades before decreased yields will show the necessity of occasionally replenishing the soil's humus and nitrogen.

The work of the experimental farms during the past fifteen years has shown that wherever climatic conditions allow, this replenishing of humus and nitrogen, this maintenance, and indeed increase, of fertility may be most readily and economically accomplished through the growth of one or other of the legumes—a family of plants possessing the unique and valuable property of appropriating the free nitrogen of the atmosphere. In establishing the manurial value of the legumes, the nitrogen-content of a number of those more commonly advised from the standpoint of soil enrichers has been determined. The results of these analyses are to be found in several of the past reports of this Division. Evidence has also been brought forward by determining the yields of various farm crops following the growth of clover or other legume. The data that we have accumulated on this important subject are voluminous, but they all point in the same direction—the increase of productiveness following the growth of the legume.

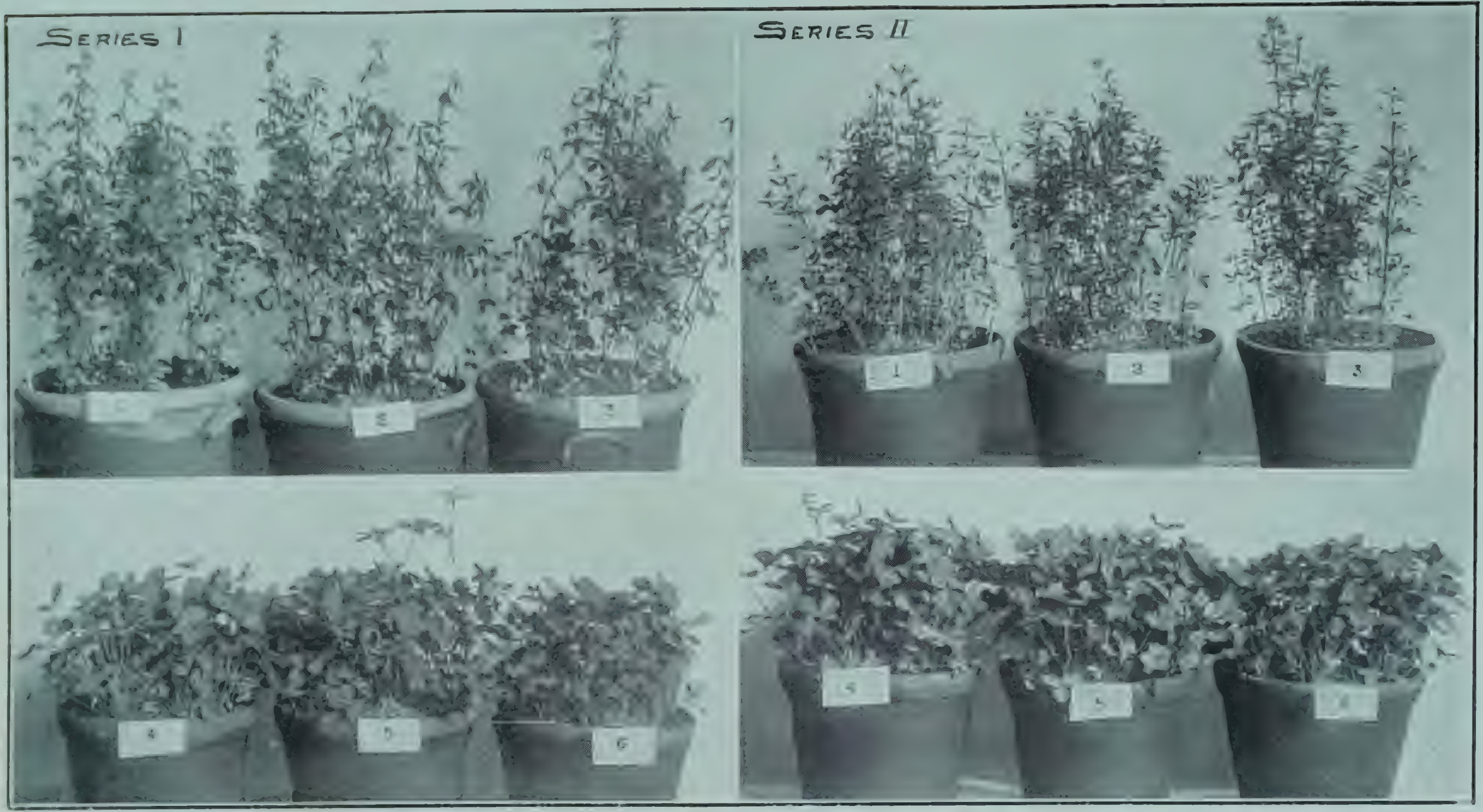

Photo. by F. T. Shutt.

SERIES No. I.—WASHINGTON CULTURES.

ALFALFA—No. 1. Seed Inoculated.
No. 2. Untreated.
No. 3. Soil Inoculated.

CLOVER—No. 4. Soil Inoculated.
No. 5. Untreated.
No. 6. Seed Inoculated.

SERIES No. II.—GUELPH CULTURES.

ALFALFA—No. 1. Soil Inoculated.
No. 2. Untreated.
No. 3. Seed Inoculated.

CLOVER—No. 4. Soil Inoculated.
No. 5. Untreated.
No. 6. Seed Inoculated.

The experiments now to be described had for their object the estimation of the amount of nitrogen that became part and parcel of the soil nitrogen through the growth of clover. By the analysis of the soil before sowing and after the decomposition of the legume it was thought that data of a valuable character would be obtained. The work was carried on in experimental pots and on a small plot simultaneously, soil poor in nitrogen being purposely selected for the investigation. The plan was to determine as accurately as possible its nitrogen content at the outset, to sow it with clover, to return the crop to the soil and after its decay to again determine the soil's nitrogen. The experiments were continued over a period of two seasons.

Pot Experiments.—Twenty-one pots, each having a diameter of 8 inches and a depth of 12 inches, were filled to a height of 9 inches with soil containing 0·0392 per cent nitrogen. These were sown with Mammoth Red clover on May 13, 1902. The pots were then sunk in the soil, level with the surface, so that moisture and temperature conditions for the clover might be as nearly normal as possible. On October 13 of the same year (1902) the crop (including the roots) was taken up, cut very fine and returned to the soil—the cut clover and the soil being thoroughly mixed. Throughout the following winter the pots were kept in the laboratory building and the soil maintained in a moist condition, so that the decay of the clover might be as complete as possible.

On June 13, 1903, the pots were again sown with Mammoth Red clover, and the growth returned to the soil in the autumn as in the previous year. In the spring of 1904 (May 14) the soils were again thoroughly mixed and sampled, the undecomposed fibre being carefully separated, and analysed. The result was 0·0457 per cent nitrogen.

Plot Experiment.—The plot used was 1/90 of an acre. Its soil to a depth of 8 inches was removed and replaced with soil thoroughly uniform throughout and containing 0·0437 per cent nitrogen. The plot was sown with Mammoth Red clover on May 13, 1902. During the season's growth the clover was cut twice and allowed to decay on the soil. At the close of the season (October 17) the crop was turned under, the soil being stirred to a depth of 4 inches. In the following spring (1903) the plot was again sown with clover which made a very fair growth. This was cut twice and finally turned under as during the previous year. On May 14, 1904, the soil of the plot was sampled to a depth of 4 inches and its nitrogen-content determined. This was now 0·0580 per cent. The following tabulated statement permits of a ready review of the results obtained:—

NITROGEN—Content of Soil before and after the Growth of Clover.

Pot Experiment.	Nitrogen.	
	Percentage (in water-free soil).	Pounds per Acre to a depth of 9 inches.
Before experiment	·0392	1,076
After experiment	·0457	1,255
Gain due to two years' growth of clover	·0065	179
Plot Experiment.		To a depth of 4 inches.
Before experiment	·0437	533
After experiment	·0580	708
Gain due to two years' growth of clover	·0043	175

The data furnish further evidence of a very satisfactory character concerning the manurial value of clover. In one set of trials, two seasons of clover had enriched the soil with nitrogen to the amount of 179 lbs. per acre, calculated to a depth of 9 inches; in the other, calculated to a depth of 4 inches, the increase was 175 lbs. per acre. This nitrogen, although not present in an immediately available condition, is associated with readily decomposable organic matter and would be set free for the use of succeeding crops.*

INOCULATION FOR THE GROWTH OF LEGUMES.

A statement regarding the results of work carried on in this investigation since 1896, by the Experimental Farms, was given in the report of this Division for last year (1904). After briefly recounting the results we had obtained from the use of German and American cultures, the opinion was expressed that the necessity for inoculation was by no means so great as was supposed by many; in other words, that the soil bacteria that serve to fix the nitrogen in the legumes had been found to be widely distributed over the Dominion. Our experience this year confirms this view. During the past season, clover plants have been received from several districts in Manitoba, all bearing nodules on their roots. Observation has gone to show that in the majority of cases in which there has been failure to obtain a good catch of clover that one or more of the following causes have been to blame rather than the absence of the necessary bacteria: Deficiency of moisture; unsuitable mechanical condition of the soil, due to lack of humus, inadequate drainage, or improper working of the soil; acidity or sourness of the soil; poor seed; or, if the crop failed the second season, the severity of the winter.

Last season (1904) we experimented with the new cultures for clover and alfalfa supplied by the Bureau of Plant Industry, Washington, D.C. The results were, on the whole, unsatisfactory, and we were consequently not in a position to report very favourably. This season we have continued the investigation with the Washington cultures, and also have experimented with those supplied by the Ontario Agricultural College, Guelph, the latter being kindly furnished by Prof. Harrison, Bacteriologist. The trials were conducted in pots and plots.

POT EXPERIMENTS.

These were made in clean, new flowers pots, with a diameter at the top of 11 inches and a depth of 13 inches. The soil was a light sandy loam of poor quality. After sowing, the pots were plunged, the rim (2 inches) only being above the surface of the soil. This was done in order to avoid as far as possible sudden changes in temperature and moisture content.

The inoculating fluids were prepared in accordance with instructions received with the cultures. In the case of the 'seed inoculated,' the seed was immersed in the cultural preparation for a few minutes and then allowed to dry by exposure to the air; with the 'soil inoculated' the inoculating fluid was used to moisten the soil to a depth, approximately, of one inch. The same number of seeds were sown in each pot.

Note.—The relatively larger increase in nitrogen obtained in the plot experiment may be accounted for by the fact, often observed, that the greater part of the root system of the clover lies in the first or upper six inches of soil. It is also possible that there had been a more complete decomposition of the clover in the plot than in the pots.

CLOVER: Weight of Fresh Material, in Grams.

Date of Cutting.	O. A. C. CULTURE, SOWN 6TH MAY, 1905.			WASHINGTON CULTURE, SOWN 13TH MAY, 1905.		
	Untreated.	Seed Inoculated.	Soil Inoculated.	Untreated.	Seed Inoculated.	Soil Inoculated.
July 17	125·7	124·2	128·6	109·7	91·9	110·0
August 12	125·8	183·3	175·3	113·7	146·4	141·3
September 30	123·2	143·2	140·5	143·5	149·4	161·9
Totals	374·7	450·7	444·4	366 9	387·7	413·2

On the date of the first cutting, July 17, no difference in vigour of growth could be observed between the O. A. C. culture pots, and the weights of the crops then taken show that the growth was practically the same in the treated and untreated pots. With regard to the Washington culture pots, the same might also be said, though the crop from the 'seed inoculated' fell somewhat behind that of the other two pots.

The data of the second and third cutting, however, show in nearly every instance a marked increase of growth from the treated clovers, so that the total weights of foliage produced in the season from them exceeded those of the untreated and check pots. Larger returns were obtained from the O. A. C. than from the Washington cultures; the results, however, do not make clear whether seed or soil inoculation was the more effective.

We may now similarly consider the data from the Alfalfa.

ALFALFA: Weight of Fresh Material, in Grams.

Date of Cutting.	O. A. C. CULTURE, SOWN 6TH MAY, 1905.			WASHINGTON CULTURE, SOWN 9TH MAY, 1905.		
	Untreated.	Seed Inoculated.	Soil Inoculated.	Untreated.	Seed Inoculated.	Soil Inoculated.
July 17	58·1	47·3	55·5	69·0	63·6	51·3
August 8	71·5	71·1	83·1	78·8	72·6	99 6
September 19	74·9	98·9	110·5	96·7	104·8	141·4
Totals	204·5	217·3	249·1	244·5	241·0	292·3

It will be noticed that as in the case of the clover, the first cuttings of Alfalfa showed no increase from the inoculated pots, indeed, the untreated seed in each case gave slightly higher yields. At the time of the second cutting, the 'soil inoculated' alone showed an advantage. An increase, however, was observed when the third cutting was made in treated Alfalfas, more especially in the 'soil inoculated' pots. Considering the total yields, it will be seen that it is only in the latter that any benefit has been derived from the cultures. The differences throughout are not large and, therefore, can scarcely be used as an argument to prove the practical value of the Alfalfa cultures.

These pots, both clover and Alfalfa, are being kept over the winter in the hope that their respective yields may be obtained next season.

PLOT EXPERIMENTS.

Clover, O. A. C. Culture.—Adjoining areas of fairly uniform soil, each 33 by 32 feet, were sown with inoculated and untreated seed. The date of sowing was May 9. Owing to the appearance of weeds, the first cutting was raked off and not weighed. The yields of subsequent cuttings were weighed as hay.

—	From Untreated Seed.		From Inoculated Seed.	
	Lbs.	Ozs.	Lbs.	Ozs.
Cutting, August 9	15	13	20	12
" Sept. 27	30	14	39	1
Total	46	11	59	13

Clover, Washington Culture.—These plots were also contiguous, each measuring 80 by 12 feet. The date of sowing was April 25. The first cutting was raked off and not weighed, owing to weeds.

—	From Untreated Seed.		From Inoculated Seed.	
	Lbs.	Ozs.	Lbs.	Ozs.
Cutting, August 9	48	12	61	1
" Sept. 27	44	13	44	13
Total	93	9	105	14

From the inoculated seed, in both instances, larger yields of hay were obtained.

Alfalfa.—Owing to insufficient drainage on one of the plots used in the experiment with Washington culture the results were vitiated, and accordingly are not given. With the O.A.C. culture, the plots were 33 by 22 feet, and adjoining; the soil, as far as could be judged, was fairly uniform throughout.

Culture—Ontario Agriculture College.	From Untreated Seed.		From Inoculated Seed.	
	Lbs.	Ozs.	Lbs.	Ozs.
Cutting, July 11	29	1	12	13
" Aug. 9	24	5	22	14
" Sept. 27	34	14	27	2
Total	88	4	62	13

We could not say that inoculation had decreased the yield, the falling off is most possibly due to other causes, but the fact remains that a heavier crop of Alfalfa hay was obtained from untreated seed in all three cuttings.

It is to be hoped that the plants on all these plots will survive the winter, so that the effect of the cultures during the second season of growth may be determined.

At the close of the season a number of roots, both of Clover and Alfalfa, from all the plots were carefully examined, but no difference in either the size, number or distribution of the nodules was to be observed, indicating that the soil of the experimental farm is well supplied with the nitrogen-fixing bacteria.

THE CONTROL OF SOIL MOISTURE IN ORCHARD SOILS.

EXPERIMENTS AT THE EXPERIMENTAL FARM, OTTAWA, ONT.

Various phases of the 'cover' crop system have been under examination for a number of years past in the orchards of the Experimental Farms at Ottawa, Ont., and Nappan, N.S., the two chief points receiving attention from the Chemical Division being the control of the soil's moisture throughout the spring, summer, and autumn seasons, and the increase of the soil's fertility.

These investigations have received discussion from year to year in the annual report, so that it merely remains to state the nature of the work of 1905 and to consider the results obtained.

Two series of experiments, each comprising 3 plots, were instituted. In the first series we sought to ascertain the moisture-content of soil under a thick mulch of straw as compared with that of a soil constantly cultivated, and consequently covered with a dry earth mulch. A plot in which the soil was left undisturbed was also included, with the expectation that its moisture-content would be found to be less than that of either of the mulched soils.

The object of the second series was to learn the relative moisture-content of soil carrying (*a*) a crop of Hairy Vetch, (*b*) a crop of tares, with that of a soil kept constantly cultivated.

This work has been, as heretofore, carried on with the advice and co-operation of Mr. W. T. Macoun, Horticulturist, to whom my thanks are due for much valuable aid.

The past summer, as regards rainfall, was characterized by an ample and well distributed precipitation, and consequently the results do not show, as they do in so many of our previous trials, any marked advantage accruing from cultivation.

Series I., Plots A, B, and C.—The first collection of samples was made on June 5, when plot C was heavily mulched with straw. The dates of cultivation for plot A were June 5, 15, 24, and 28; July 7, 22; August 4, 17 and 25; September 1, 13 and 25. Plot B was left undisturbed, but as a crop of weeds appeared it was mown July 22, to prevent them from going to seed.

SERIES I.—Conservation of Soil moisture, C. E. F., Ottawa, Ont., 1905.

Date of Collection.	Rainfall.	PLOT A. — Cultivated.			PLOT B. — Undisturbed.			PLOT C. — Mulched with Straw, 10 in. to 12 in.		
		Water.			Water.			Water.		
		Per cent.	Per acre.		Per cent.	Per acre.		Per cent.	Per acre.	
	Inches.		Tons.	Lbs.		Tons.	Lbs.		Tons.	Lbs.
June 5	*2·29	15·87	360	1,012	18·07	421	1,132	16·57	379	1,131
" 26	3·22	20·62	496	874	20·21	484	131	19·01	448	1,154
July 10	1·60	23·60	655	1,578	20·95	506	975	21·31	530	510
" 24	2·12	18·25	426	1,280	18·92	445	1,916	18·17	424	709
Aug. 8	2 54	18·84	443	1,269	19·77	470	1,860	17·63	409	330
" 21	2·45	17·71	410	1,383	17·60	408	398	20·29	486	939
Sept. 5	1·96	15·07	339	217	16·99	391	311	20·52	493	815
" 18	·64	15·21	342	1,648	17·52	405	1,887	21·67	525	1,198
Oct. 2	1·36	17·81	414	250	18·14	423	997	19·95	476	572
" 16	1 40	19·43	460	1,756	19·31	457	709	22·48	554	406

* May 1 to June 5.

All three plots show a remarkable uniformity in moisture-content, due no doubt to the high rainfall before referred to. The effect of the straw mulch in conserving moisture is, however, observable after August 21, for from that date on to the end of the season the soil of plot C contained from 2 per cent to 5 per cent more moisture than that of either of the other plots. On one or two dates it appears that the undisturbed plot contained slightly higher percentages of moisture than the cultivated plot, but the differences are very small and we may conclude that both soils were very nearly at the point of saturation throughout the season.

Series II.—Plots D. E. and F.:—Plots E. and F. were sown in rows 8 inches apart, respectively with Hairy Vetch and tares on June 30. Plot D. was cultivated June 16, 24 and 28, July 12, 22, August 4, 17 and 25, September 1, 13 and 25. The first collection of soils was made on June 16.

SERIES II.—Conservation of Soil Moisture, C. E. F., Ottawa, Ont., 1905.

Date of Collection.	Rainfall.	PLOT D. — Cultivated.			PLOT E. — Hairy Vetch.			PLOT F. — Tares.		
		Water.			Water.			Water.		
		Per cent.	Per acre.		Per cent.	Per acre.		Per cent.	Per acre.	
			Tons.	Lbs.		Tons.	Lbs.		Tons.	Lbs.
June 16	*5·37	13·16	306	1,539	11·62	266	188	12·16	280	463
" 30	1·16	12·81	297	823	10·78	244	1,173	10·48	236	1,966
July 14	1·25	13·24	308	1,837	10·60	240	36	11·48	262	1,057
" 28	1·85	11·79	270	1,130	8·31	183	931	10·22	230	868
Aug. 11	2·14	10·44	235	1,934	8·38	185	305	9·75	218	1,384
" 25	2·45	8·56	185	1,003	8·91	198	16	9·21	205	702
Sept. 8	2·01	10·08	226	1,847	10·66	241	1,077	9·83	220	1,364
" 22	1·61	14·76	350	1,049	12·49	288	1,844	12·53	232	1,634
Oct. 6	·74	12·79	296	1,759	9·36	209	1,185	10·82	245	1,208
" 20	1·52	16·08	387	1,770	17·35	424	1,889	15·52	371	1,778

*May 1 to June 16

Compared with plot D., cultivated, the soil of plot E., bearing Hairy Vetch, showed a slight falling off in moisture in the early part of the season. After the middle of August, however, save on one or two dates, it would not appear that the soil with the crop had at all suffered any moisture exhaustion, so ample was the rainfall and effective the protection offered by the heavy growth that was made.

The draft on the soil moisture through the growth of Tares was very similar to that noticed in the case of the Hairy Vetch; it was not sufficient to cause any very marked effect. This we attribute to the causes just mentioned. The Tares, as did the Vetch, grew luxuriantly, completely covering the ground.

The results this season at Ottawa have not emphasized the necessity of cultivation for conserving soil moisture, but this is easily explained by reference to the rainfall, which it will be seen was both ample and well distributed throughout the season. They must not be considered as throwing any doubt upon the useful function of cultivation in districts where the rainfall is deficient, for that has been amply proven by our expements in past seasons, confirmatory evidence also being given in the chapters following, stating the results obtained this year at Nappan, N.S.

EXPERIMENTS AT THE EXPERIMENTAL FARM, NAPPAN, N.S.

In the experiments conducted on the Experimental Farm, Nappan, N.S., six plots were employed. In this series we are able to contrast throughout the season the moisture content of soil (1) bearing an oat crop, (2) carrying a second season's growth of clover (with Timothy)and harvested, (3) similar to (2) but with the growth cut from time to time and used as a mulch, (4) cultivated till June 15, then sown with Crimson clover, (5) cultivated till July 20, then sown with Crimson clover, (6) cultivated until July 20 then left undisturbed.

CONSERVATION of Soil Moisture, Nappan, N.S., 1905.

Date of Collection.	Rainfall.	PLOT 1. Oats harvested with Timothy and Clover.			PLOT 2. Clover with Timothy 2nd season's growth —Harvested.			PLOT 3. Clover with Timothy 2nd season's growth —Mulched.			PLOT 4. Cultivated till June 15 and then seeded with Crimson Clover.			PLOT 5. Cultivated till July 20 and then seeded with Crimson Clover.			PLOT 6. Cultivated until July 20.		
		Water.			Water.			Water.			Water.			Water.			Water.		
		Per cent	Per acre.		Per cent	Per acre.		Per cent	Per acre.		Per cent	Per acre.		Per cent	Per acre.		Per cent	Per acre.	
	Inches.		Tons.	Lbs.		Tons.	Lbs.		Tons.	Lbs.		Tons.	Lbs.		Tons.	Lbs.		Tons.	Lbs.
May 15	*3·36	17·40	443	1,716	16·04	401	1,127	17·33	440	1,257	16·50	415	710	16·28	408	1,480	17·76	453	1,845
June 1	·90	16·37	411	872	14·23	348	1,462	13·83	337	711	15·25	378	453	16·97	429	1,209	14·74	363	782
" 16	1·80	15·54	386	1,485	14·88	366	1,599	15·94	398	1,170	16·19	406	207	15·78	393	1,669	18·02	462	58
" 29	1·53	16·30	409	680	19·06	494	1,947	18·52	477	1,526	17·50	445	1,736	17·97	460	932	17·92	458	1,810
July 17	1·39	11·02	260	644	8·08	184	1,533	11·77	280	805	13·89	339	111	15·65	389	1,976	14·59	359	123
Aug. 2	·23	5·63	125	799	7·26	164	1,095	7·12	161	262	9·73	226	1,128	15·50	385	1,129	15·02	371	1,028
" 15	·84½	5·17	114	1,190	5·91	132	56	5·64	120	567	7·87	179	1,108	14·11	345	616	14·03	343	61
" 30	·03½	5·01	110	1,723	4·17	91	930	4·37	96	105	5·26	116	1,402	9·97	232	1,654	14·36	352	904
Sept. 18	3·40	12·66	304	1,358	10·52	247	244	12·58	302	953	11·47	272	659	14·68	367	1,035	16·31	409	1,291
Oct. 3	·57	11·22	265	1,288	9·05	209	309	10·61	249	975	9·24	213	1,986	12·67	304	1,909	13·06	315	1,503
" 18	·09	9·34	222	125	6·71	151	370	8·01	183	53	6·69	150	1,405	9·44	219	215	11·34	268	1,697

*April 1 to May 15.

Rainfall during the season.—April was characterized by a very small rainfall (1·24 inches) not half that which fell in April of the two preceding years. May and June had very fair and well distributed precipitations; the totals were 3·02 and 3·30 inches, respectively. July and August were very dry, the total being only 1·56 and 1·53 inches, many of these rains being so slight that the moisture was evaporated before it could penetrate the soil. September had a fair rainfall, 3·38 inches, while October was comparatively dry, with only 1·29 inches.

Plot 1.—The crop of oats, which had made good growth, though the seed had not filled out well, was harvested on September 3. The results show that the moisture content of this plot was greatly and steadily reduced from the end of June till September 1, and again slightly reduced during October. From the middle of July to the end of August the soil was exceedingly dry (in the neighbourhood of 5 per cent moisture). The oats suffered much from drought during this period and there can be no doubt that the moisture available for the orchard trees was altogether insufficient for their needs. Confirmatory evidence of a most emphatic nature is furnished by the data from this plot of the great exhaustion of soil moisture by a grain crop.

Plot 2.—This carried a crop of clover and timothy, having been seeded (with oats) in the spring of 1904. It was cut on July 20, having made excellent growth, and yielded about 2½ tons of hay to the acre. The moisture content data are very similar to those of Plot 1, indicating a very large draught on the store of soil moisture by the growth of clover. During the first two weeks of July the moisture was reduced from 19·06 per cent to 8·08 per cent and continued to fall until the end of August, when the soil contained only 4·17 per cent.

Plot 3.—This, like Plot 2, bore a crop of clover and timothy, but the growth was cut from time to time and used as a mulch. The first cutting was on June 16, when the crop was about 12 inches high; the second on July 8, with about the same amount of growth. No further cutting was possible, as owing to the very dry period in July and August no material growth was subsequently made. Mr. Blair reports that the mulches rapidly dried out and quickly became valueless in conserving moisture. The analytical data are very much the same as those for Plot 2, and, therefore, confirm the conclusions regarding the great draught on the soil's moisture. They require no special comment further than to say that the mulch seems to have been effective in checking to a certain degree the loss of soil moisture during the first two weeks of July—an important matter. After the middle of July the mulch evidently exercised very little beneficial influence so far as soil moisture is concerned.

Plot 4.—The soil of this plot was cultivated until June 15, and then sown with Crimson clover. The effect of this cultivation is very apparent; it postponed at least two weeks the severe drying out so noticeable on the plots already discussed. On August 2, this soil contained considerably more moisture than those of Plots 2 and 3, and nearly twice as much as that on Plot 1.

Plot 5 and Plot 6.—Were cultivated until July 20, the former at that date being sown with Crimson clover. Plot 5 maintained, practically, its initial moisture content all through the period of drought, the first decline—and that a slight one—being recorded by the determination made on August 30. After the middle of September a further, but not very large, falling off is observable, due to the growth of clover. Plot 6, though showing some fluctuations, practically held its moisture content throughout the growing season.

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* In this investigation the scheme was planned by Mr. W. S. Blair, Horticulturist, Experimental Farm, Nappan, N.S., and myself. Mr. Blair undertook all the work in connection with the plots and also collected the fortnightly soil samples. In his report, full cultural notes, made during the season, are to be found.

The value of cultivation has been by this series well brought out. The severe drought during July and August specially accentuated this year the importance of the dry earth mulch in conserving the moisture so necessary for the growth and thrift of orchard trees, but the results may well serve as a guide for the management of orchard soils in all districts where an insufficient rainfall is likely to occur.

NATURALLY-OCCURRING FERTILIZERS AND WASTE PRODUCTS.

MARSH MUD.

This was collected at Flannery's Point, near Bathurst, N.B., and forwarded by T. M. Burns, M.P.P., through Mr. T. A. Peters, Deputy Minister of Agriculture, Fredericton, N.B.

The sample as received was of a light-grey colour, having all the appearances of clay. It was practically free from stones, sticks, or other foreign matter. On exposure to the air it dried into lumps or masses, which were, comparatively speaking, easily crushed and reduced to powder.

Analysis of (Air-dried) Mud.

	Per Cent.
Moisture	3·83
Loss on ignition-organic matter	15·77
Clay and sand	66·69
Oxide of iron and alumina	8·33
Lime	·65
Magnesia	1·57
Potash	·65
Phosphoric acid	·15
Undetermined, including salt	2·36
	100·00
Nitrogen, in organic matter	·585

It will be obvious from the above data that although this 'mud' is not destitute of plant food it cannot be considered in any way comparable to farm manures or commercial fertilizers. However, if its application does not injuriously affect the tilth or mechanical condition of the soil, I think it might be found a useful amendment.

Its chief fertilizing constituent is nitrogen, of which it contains about as much as is found in our best soils, and, therefore, it is possible that a tolerably heavy application on soils poor in organic matter and nitrogen might prove of considerable benefit.

My advice would be to try it at first on a small area and to note the result, both on the condition of the soil and the crop yield. The character of the soil will no doubt have much to do with its efficiency, and careful notes should be taken as to the nature of the soil to which it is applied and the number of loads spread per acre.

In conclusion, it may be stated that its composition does not, I think, warrant any great expenditure in its application, and this furnishes another reason for ascertaining its effect on a small area before extensively applying it.

SEMI-DECAYED SEAWEED.

This material was forwarded by Mr. Donaldson, of Port Williams, N.S., who furnished the following information regarding its occurrence:

'It is from Westport on Briar Island, the extreme western part of Nova Scotia, where it is quite plentiful all along the shores of the island. It is there used as a fertilizer, chiefly for grain and grass, I think. Several barrels were sent to our county last spring and orchardists in this vicinity would be glad to know its value.'

As received, it was a pasty mass, decomposition apparently having proceeded to a considerable degree.

Analysis of Semi-decayed Seaweed.

	Per Cent.
Water	61·03
Organic matter	28·92
Ash or mineral matter	10·05
	100·00
Nitrogen	1·20
Phosphoric acid	·19
Potash	·90

Some years ago a sample of fresh seaweed (*Fucus furcatus*) was analysed, the data of which may here be given for the purpose of comparison.

Analysis of Fresh Sea-weed.

Water	63·49
Organic matter	27·93
Ash or mineral matter	8·58
	100·00
Nitrogen	·468
Phosphoric acid	·108
Potash	2·025

The general result of the decomposition, it will be seen, has been to increase the nitrogen-content and to decrease the percentage of potash, so that while the fresh seaweed is essentially a potassic manure, the semi-decayed weed is more particularly nitrogenous.

The value of sea-weed as a manure is undoubtedly enhanced by the readiness with which this naturally-occurring fertilizer decomposes in the soil, quickly liberating its constituents in forms available to crops.

GYPSUM OR LAND PLASTER.

The agricultural uses and value of gypsum or land plaster have been discussed in previous publications (see pages 163-4 An. Rep. Exp. Farms 1900). It may, therefore, suffice here to give the results of the analyses of certain samples examined this year. From correspondence we judge that the use of finely ground gypsum in barns and stables is increasing, and we are of the opinion, from all points of view that this in general is the most advantageous method of employing it.

ANALYSES of Gypsum.

—	No. 1.	No. 2.	No. 3.	No. 4.	No. 5.
Sulphate of lime	94·53	91·58	73·15	68·98	74·25
Insoluble rock matter	·78	2·00	7·45	15·75	11·95
Carbonate of lime, &c. (undetermined)	4·69	6·42	19·40	15·27	13·80
	100·00	100·00	100·00	100·00	100·00

Nos. 1 and 2, labelled 'white' and 'grey,' respectively, and forwarded by General Laurie, Oakfield, N.S. Quarried at Dutch Settlement, Halifax county, N.S.

Both are excellent samples, but the 'white" (No. 1) is somewhat the better of the two. No. 1 has also superior value by reason of its greater fineness.

No. 3. White or grey coloured, manufactured by the Alabastine Co., Ltd., Paris, Ont., submitted by K. McDonald, Ottawa, Ont.

No. 4. Brown or chocolate coloured, supplied by Mr. Manly H. Craig, Perth, N.B., submitted by Kenneth McDonald, Ottawa, Ont.

Sample No. 3 is distinctly superior to No. 4, though neither is equal to the first two samples considered.

No. 5. From 'Plaster Rock,' Tobique River, N.B., furnished by M. H. Craig, Perth, N.B. It is of distinctly better quality than No. 4, though apparently from the same quarry.

FERTILIZING VALUE OF COTTON WASTE.

This refuse material was from the cotton mills at Montmorency Falls, Que. As received, it formed a black, pasty mass and was neutral to test paper. It dried readily on exposure and was then easily reduced to a powder by crushing and grinding.

Analysis of Waste (as received).

	Per Cent.
Water	58·66
Organic matter	15·41
Mineral matter (containing sand, &c., 20·94)	25·93
	100·00
Nitrogen	·72
Phosphoric acid	·27
Potash	·95

We doubt if this waste could be economically manufactured into a fertilizer. The greater part of the water would have to be got rid of—a more or less expensive matter when undertaken on a large scale. Secondly, this accomplished, the percentages of plant food would not then equal those in most brands of commercial fertilizers. And, thirdly, the condition or combination of the plant food in this 'waste' is not the most valuable from the agricultural standpoint: in other words, without treatment, the waste would not readily furnish available nourishment for crops.

If obtained for little cost, however, it might be converted by the farmer into a useful manure by composting, say, with lime or wood ashes.

FLUE ASHES.

These ashes are from the flues or dust chambers of the blast furnaces at the Londonderry, N.S., iron mines. The sample was forwarded by Mr. G. R. Fleming, Folly Mountain, N.S., who thought they might possess some fertilizing value.

Analysis of flue ashes.

	Per Cent.
Lime	12·16
Oxide of iron	31·79
Phosphoric acid	·26
Potash	·17
Nitrogen	·23

Considering the nature of the material, the percentage of nitrogen is quite notable. Presumably the nitrogen is present as ammonium salts.

The percentages of phosphoric acid and potash are very small and though there is a notable amount of lime, we are unable to speak definitely as to its availability. My opinion, therefore, is that the fertilizing value of these ashes is negligable. On heavy clay soils, however, they might be of some benefit in improving the texture.

FODDERS AND FEEDING STUFFS.

Though we have never attempted any systematic or comprehensive examination of the feeding stuffs sold in Canada, we have every year analysed many of them regarding which information and advice have been sought. The use of concentrated feed stuffs to supplement the protein and fat of the home grown fodders, and thus balance the ration, is constantly on the increase. Only a few years ago the feeds employed by farmers and dairymen were very limited in number and comparatively simple in character—bran, shorts, provender and ground Indian corn; these, with the addition of oil cake and one or two meals, comprised the list of those upon the market. But the case is very different now. The by-products of the starch factories, of the rice mills, of the manufactories of breakfast foods, etc., etc., now find a ready sale. These various feeds differ widely in their composition, and hence in their nutritive value, and the farmer cannot intelligently or profitably use them unless he knows their composition, more especially as to the percentages of protein and fat they contain. The protein and fat are the most important and the most costly nutriments in a food. There are, of course, other constituents of feeding value in these 'concentrates,' but in estimating the value of these feeds it is the proportion of protein and fat that must be principally considered, as it is for them practically alone that they are purchased, for the reason already stated.

For a number of years the writer has claimed that an annual inspection and analysis of the feeds upon the Canadian market should be made; in other words, that as there is an official examination of fertilizers (plant foods), so there should be an equal protection to the farmer by the official examination of these feeds (cattle foods), for in many instances it is quite impossible to arrive at a correct opinion as to the value of these by-products without an analysis. This matter has also been recently urged by the authorities of the Ontario Agricultural College and the Experimental Union—a society of co-operative workers in connection with that institution.

It is, therefore, with much pleasure that I can announce as a result of these representations that the Department of Inland Revenue, the branch of the Government Service which annually analyses the commercial fertilizers, has taken initiatory steps towards this end. A collection is now being made by the officers of that department in various parts of Canada of these feeding stuffs and the analyses will be made in due course. I am, further, authorized to say that the results of this examination will be published early in the coming year in bulletin form, and thus will be available for the guidance of purchasers.

During the past year a number of such feeding stuffs have been submitted to us. As far as time permitted, these have been analysed. The results appear in the subjoined table, but since in previous reports the sources and character of the greater number of them have received discussion, it will only be necessary now to add briefly remarks upon their comparative values as deduced from the analytical data. They comprise 'mixed' feeds of various character, the products of the starch factories (gluten meal, gluten feed, and corn bran), oil cake and meals, cotton seed meals and a few other miscellaneous feeds. Much of the profit in dairying and stock feeding lies in the judicious balancing of the ration, and we feel assured that great assistance towards that end may be obtained by a consultation of the data here presented.

ANALYSIS of Feeding Stuffs, 1905.

Number.	Name.	Particulars.	Moisture.	Protein.	Fat or oil.	Carbo-hydrates.	Fibre.	Ash.
1	"Cattle Feed" No. 1	Insp. of Live Stock Shipments, Montreal.	11·22	9·06	4·29	67·47	5·73	2·23
2	" No. 2		9·38	8 06	4·06	69·11	7·19	2·20
3	" No. 3		12·82	8·94	3·71	67·24	5·06	2·23
4	" No. 4		10·90	10·00	4·57	66·00	6·18	2·35
5	Victor Corn and Oat Feed.	American Cereal Co., Peterboro'	8·29	7·75	3·29	66·55	12·11	3·01
6	Banner Cattle Food	" "	8·38	7·75	4·46	68·55	8·56	2·30
7	Ground Oat Hulls	" "	5·23	2·81	1·52	53·40	32·48	4·56
8	"Mixed Feed"	Quoted by J. N. Tilton, St. John, at $30 per ton.	.....	9·63	3·59	......	......	....
9	"Oat Feed"	Ogilvy Milling Co., Lt	10·74	7·75	2·25	60·75	14·86	3·65
10	Gluten Meal	Edwardsburg Starch Co., Lt., Cardinal.	9·71	32·31	2·44	54·27	·74	·53
11	Gluten Feed	" "	8·31	25·38	2·17	58·31	5·30	·53
12	Corn Oil Cake	" "	7·89	22·25	15·69	43·51	8·90	1·78
13	Corn Bran	" "	8·15	9 12	3·23	67 05	12·05	·40
14	Gluten Meal	" "	8·72	36·69	3·36	......	.....	....
15	Gluten Feed	" "	6·62	22·99	3·50	......	.....	....
16	Corn Bran	" "	8·72	10·43	3·22	...	......	....
17	Gluten Feed	" "	.....	22·75	2·03	......	......	....
18	"Gluten Meal"?	Brantford Starch Co., Brantford	8·19	12·44	7·92	64·29	6·51	·65
19	Gluten Feed	Imperial Starch Co	7·37	21·06	6·20	58·27	6·42	·68
20	Linseed or oil cake	Dom. Linseed Oil Co., Lt	......	29·56	10·84	......	......	....
21	" "	Can. Linseed Oil Mills, Lt	......	32·12	6·41	......	......	....
22	Oil Cake Meal	Dom. Linseed Oil Co., Lt	......	27·06	13·75	......	......	....
23	" "	Can. Linseed Oil Mills, Lt	......	31·62	9·98	......	......	....
24	Cotton-seed Meal	"Prime Bright," Broker C. A. Smith, St. John.	......	37·94	......	......	......	....
25	" "	"Second Bright," Broker C. A. Smith, St. John.	......	19·94	......	......	......	....
26	" "	No. 1 Broker, Frank Oliver, Toronto	......	39·88	8·97	......	......	....
27	" "	No. 2 Am. Cotton Oil Co	......	41·25	7·80	......	......	....
28	Spirit Grains	G. & W., Toronto	4 05	29·06	6·32	48·54	10·76	1·27
29	Goose Wheat	A. W. Milne, Markham	11·25	12·50	1·90	70·78	1·81	1·76
30	Fall Wheat	" "	12·47	8·44	1·84	73·46	2·00	1·79
31	Soda Biscuits	Factory at London, Ont.	5·35	9·31	13·68	69·12	·08	1·97
32	Rice Meal	B. C. Rice Mills	9·06	12·25	15·73	50·01	5·83	7·12

MIXED FEEDS.

Nos. 1, 2, 3 and 4.—These were forwarded by the Inspector of Live Stock Shipments, Montreal (Department of Marine and Fisheries) with a request for an analysis and report on their relative values. These feeds were intended for the use of cattle en route to England. They were found to consist essentially of crushed corn and oats. There is a general similarity between them, and the differences in nutritive values are not great, but a careful scrutiny of the data allows us to arrange the feeds in the following order of merit: First, No. 4, by reason of its higher protein and fat content; second, No. 1, and No. 3, which are practically equal, with a protein content essentially 1 per cent lower than that of No. 4; third, No. 2, which contains 2 per cent less protein than No. 4 and 1 per cent less than Nos. 1 and 3, and is the highest of the series in fibre.

Nos. 5, 6 and 7.—Products of the American Cereal Company, Peterboro, Ont. In the most important constituent, protein, the Victor Corn and Oat Feed and the Banner Cattle Food are identical. The latter, however, is somewhat the richer in fat and poorer in fibre, and consequently is the better feed, though the difference between the two in nutritive value would not be large. Though wholesome feeding stuffs, their comparatively speaking low protein content precludes them from the list of high class 'concentrates.'

No. 7—Oat Hulls.—The analysis shows very well the practically worthless character of 'oat hulls,' when considered as a feed. It is difficult to understand how such a material can obtain purchasers, but the writer is informed that large quantities of this ground hulls and other waste from oatmeal and cereal mills find a ready sale among farmers and dairymen in various parts of the country at fairly good prices. There are, of course, different grades or qualities of such feeds, but in general they will be found very low in protein and high in fibre. They consequently occupy a position at the very bottom of the list of purchased feeds, and great judgment and knowledge of the comparative prices and feeding values are necessary in order to use them with profit. The 'mixed' feeds, of which there are now so many sold, give the miller an opportunity of disposing of hulls, sweepings, and other almost worthless material at prices far in excess of the feeding values.

No. 8.—'Mixed Feed,' sent by F. W. Davidson, Sussex, N.B., and quoted by I. N. Tilton, broker, St. John, at $30 per ton. It consists largely of cracked corn, bran and oat by-products, there being quite a large proportion of oat hulls. It is not a food of high quality and certainly is not worth the price quoted.

No. 9.—'Oat Feed,' sent by G. S. Kinnear, Sussex, N. B., and stated to be manufactured by the Ogilvy Milling Company. Its composition is said to be made up of ground oats and feed flour in equal proportions. A mechanical examination showed it to contain, approximately, 72 per cent fine meal and 28 per cent oat hulls. The analysis does not give it a high rating.

CORN BY-PRODUCTS—GLUTEN MEAL, ETC.

Nos. 10, 11, 12 and 13.—These are the by-products of the Edwardsburg Starch Company, Cardinal, Ont. The samples were sent by the company in January as representative of their various brands of feed. Their comparative feeding values may be easily arrived at by a consideration of the data for protein and fat. Gluten Feed is a mixed product, Gluten Meal and Corn Bran being the components.

Nos. 14, 15, and 16.—These are further samples of Gluten Feed and Corn Bran sent by the Edwardsburg Starch Company, in November, 1905.

No. 17.—Is a sample of Gluten Feed forwarded by P. G. Mills, Sussex, N.B., and stated to be manufactured by the Edwardsburg Starch Company.

No. 18.—'Gluten Meal,' forwarded by P. G. Mills, Sussex, N.B., and stated to be from the Brantford Starch Company. It is not gluten meal; indeed, it contains but little more than one-half the protein found in most gluten feeds.

No. 19.—Gluten Feed, submitted by Dwyer & Co., Ottawa, and stated to be a product of the Imperial Starch Company, Prescott, Ont. While having a slightly higher fat content than the Edwardsburg Gluten Feed, it is not quite so rich in protein.

LINSEED OR OIL CAKE AND MEAL.

Nos. 20, 21, 22, and 23.—These are linseed oil cakes and meals from the Dominion Linseed Oil Company, and the Canada Linseed Oil Mills, as stated in the table. They are all genuine and of good quality, though differing somewhat in their composition. The data of the protein and fat will allow the feeder to judge of their relative merits and greatly assist when considering their prices.

COTTON SEED MEAL.

Nos. 24, 25, 26, and 27.—Are Cotton seed meals. Nos. 24 and 25 were sent by F. W. Davidson, Sussex, N.B., who reported their prices at $30 and $27.25 per ton, respectively. The analyses show a much greater difference in feeding value than is indicated by $25 per ton. Nos. 26 and 27, also sent by F. W. Davidson, are of much better quality. They are quoted at $32.25 and $32.50 per ton, respectively.

SPIRIT GRAINS.

No. 28, 'Spirit Grains.'—A by-product from the distillery of Gooderham & Worts, Toronto. This is a feed of high value, being rich in both protein and fat. It ranks with oil cake, gluten meal and other concentrates in this respect.

GOOSE AND FALL WHEAT.

Nos. 29 and 30—Goose and Fall Wheats.—These were submitted by A. Ward Milne, Markham, with a view of obtaining data regarding their relative values for feeding purposes. The high protein content of the Goose Wheat makes it much the more valuable from this standpoint.

SODA BISCUITS.

No. 31—Broken Soda Biscuits.—These can frequently be obtained from biscuit factories at prices that permit of their being used as a feed for pigs, &c. The analysis shows a high fat content and a very fair percentage of protein. At the price quoted, $20 per ton, they are very good value.

RICE MEAL.

No. 32.—Rice Meal, sent by Chas. B. Jones, Colquitz, B.C., and said to be from the British Columbia Rice Mills. Price quoted $16 per ton. This is an excellent feed, particularly rich in fat and with a protein content equal to that of hard wheat.

CONDIMENTAL AND SO CALLED STOCK FOODS.

Inquiries are being constantly received as to the feeding value of these preparations, of which there are now a number upon the market. The claims made for these, it is only right to state, are not based simply upon the percentages of protein and fat present. It is urged that in addition to their food value they are appetizers, tonics, and assist in the digestion and assimilation of the rest of the ration; that they are in fact both food and medicine. It is for this reason that the analyses of those we have examined this year are not incorporated with those of the feeds already considered.

A few notes made from their chemical and microscopical examination may be added, though it is not claimed that all the herbs, roots and drugs present have been detected.

ANALYSIS *of* Condimental Foods.

—	Herbagium.	International Stock Food.	Anglo-Saxon Stock Food.	Sugar and Flax.
	p. c.	p. c.	p. c.	p. c.
Moisture	6·70	8·83	9·11	9·82
Protein	22·94	13·06	17·66	24·69
Fat	6·98	4·29	3·57	9·90
Carbohydrates	40·61	45·15	40·48	43·86
Fibre	7·86	11·97	10·80	6·56
Ash	14·91	16·70	12·83	5·17
Sulphur (free)	....	....	5·55	

Herbageum.—This consists essentially of linseed and wheat bran or some wheat refuse. Fenugreek, sugar, charcoal and salt are also present.

International Stock Food.—Its principal ingredient is a wheat feed. Salt, charcoal, and fenugreek were also detected and some bitter drug, probably gentian, also noted.

Anglo-Saxon Stock Food.—Largely linseed meal. It contains charcoal, salt, sulphur, fenugreek and probably gentian.

Sugar and Flax.—Its chief component is linseed meal. Fenugreek, charcoal and salt were also detected. Sugar is not present.

Our position with regard to these preparations is that all the ingredients are of a cheap character and the prices asked are altogether extravagant, whether they are to be regarded as foods or medicine, or both. Thus, the price of herbageum is $12 per hundred weight, and as a food its value cannot be equal to that of oil cake meal. We do not deny that such condimental foods may at times be useful, but we do not think their continued or general employment is either necessary or economical. It has been shown by careful experiment that animals in good health do not thrive any better from the addition of such 'tonics' to their food, and it seems only reasonable that it would be far cheaper and more rational to treat stock out of condition as their ailments require.

THE RELATIVE VALUE OF ROOTS.

In continuing the examination of field roots to learn their relative food value and the effect of seasonal conditions upon their composition, we have analysed this year 17 varieties of mangels, 20 varieties of turnips, and 11 varieties of carrots, all grown on the Central Experimental Farm.

Mangels.—The percentages of dry matter and sugar are, on the whole, considerably below those usually obtained here. This, we believe, is due to the somewhat abnormal character of the season, which was marked by high rainfall and high daily temperatures. Under these conditions the roots did not thoroughly mature and the storing up of sugar during September and October to a certain extent was interfered with. For the best results it is generally conceded that an ample though not excessive precipitation during the first three months of summer, with comparatively low temperatures, followed by a moderately dry, warm, but not too hot, ripening season (September and October) are the best conditions for the production of sugar in roots. The averages for 10 varieties analysed in 1904 were: dry matter, 11·69 per cent, sugar in juice, 6·62 per cent. This season, for 20 varieties we obtained: dry matter, 10·04 per cent, sugar in juice, 4·61 per cent.

Analysis of Mangels, C.E.F., Ottawa, Ont., 1905.

Variety.	Water.	Dry Matter.	Sugar in Juice.	Average weight of one Root.	
	p. c.	p. c.	p. c.	Lbs.	Oz.
Selected Mammoth Long Red	87·18	12·82	6·95	3	9
Yellow Intermediate	87·85	12·15	6·36	3	4
Gate Post	87·93	12·07	6·83	2	13
Leviathan Long Red	88·45	11·55	5·88	4	3
Half Long Sugar White	88·94	11·06	4·65	4	0
Giant Sugar	88·95	11·05	5·15	4	5
Half Long Sugar Rosy	89·63	10·37	5·07	2	15
Triumph Yellow Globe	89·87	10·13	4·86	4	10
Prize Mammoth Long Red	90·06	9·94	5·56	3	14
Giant Yellow Intermediate	90·09	9·91	3·88	4	2
Ideal	90·20	9·80	5·07	3	4
Mammoth Long Red	90·82	9·18	3·44	2	3
Giant Yellow Globe	91·36	8·64	3·55	3	12
Selected Yellow Globe	91·47	8·53	4·67	3	7
Mammoth Yellow Intermediate	91·83	8·17	3·45	4	3
Lion Yellow Intermediate	92·19	7.81	1·93	3	9
Prize Winner Yellow Globe	92·48	7·52	2·14	3	14
Average of 17 varieties	89·96	10·04	4·67	3	9

The varieties have been arranged in this table in the order of their 'dry matter' and sugar, beginning with the highest, and it will be noticed that between the first and last of the series vast differences occur. We do not think that the value of roots as part of the ration depends entirely on the percentages of dry matter and its sugar content, but we have no hesitation in saying that of two roots, the one containing 12·82 per cent dry matter with a sugar content of 6·95 per cent, the other with but 7·52 per cent dry matter and 2·14 per cent sugar, the former must be much the more valuable feed. This important matter has been called attention to in former reports and is again emphasized that farmers in choosing their varieties of mangels may consider not only yield per acre, but also the composition of the roots. It is not at all probable that the same order as here given will be preserved for any two successive seasons, but the data presented bear an added importance when it is remembered that all these mangels were grown under the same climatic and cultural conditions. The 'breed' factor has been investigated for a number of years past by us, using two varieties of mangels (see the following chapter) and the results clearly show that despite changes due to season, &c., each variety has held its own relative position for six seasons.

Turnips.—The differences in composition are not so great as with mangels, and this fact serves to bring the averages of the dry matter of these two classes of field roots very close together. In sugar content, however, the turnip is distinctly inferior to mangels. This season, as with all classes of roots grown here, the percentage of sugar is below the average.

ANALYSIS OF TURNIPS, C.E.F., OTTAWA, ONT., 1905.

Variety.	Water.	Dry Matter.	Sugar in Juice.	Average weight of one Root.	
	p. c.	p. c.	p. c.	Lbs.	Oz.
Mammoth Clyde	88·49	11·51	1·52	2	7
Sutton's Champion	88·54	11·46	1·01	2	11
Hartley's Bronze	88·80	11·20	1·01	1	13
New Century	89·10	10·90	1·01	2	9
Selected Purple Top	89·21	10·79	0·50	2	14
Imperial Swede	89·29	10·71	1·11	2	8
Kangaroo	89·34	10·66	1·02	2	14
East Lothian	89·78	10·22	0·91	3	1
Elephant's Master	90·00	10·00	1·22	3	0
Skirvings	90·09	9·91	1·32	3	9
Bangholm Selected	90·10	9·90	1·42	2	5
Halewood's Bronze Top	90·10	9·90	0·91	2	5
Magnum Bonum	90·17	9·83	1·01	3	8
Perfection Swede	90·19	9·81	1·01	2	11
Drummond Purple Top	90·21	9·79	0·81	3	13
Good Luck	90·64	9·36	1·21	3	9
Carter's Elephant	90·72	9·28	0·81	3	2
Jumbo	91·08	8·92	1·31	3	6
Emperor Swede	91·18	8·82	1·12	3	9
Hall's Westbury	91·19	8·81	1·83	2	3
Average of 20 varieties	89·91	10·09	1·10	2	13

With this greater uniformity in composition there is not the same necessity in selecting turnips as with mangels, and yield per acre and keeping qualities become the chief factors to consider.

Carrots.—On the whole, carrots are slightly higher in dry matter than turnips, and in regard to sugar content occupy a middle place between mangels and turnips. The differences between the varieties while not so great as with the mangels, are larger than those noticed in the varieties of turnips.

ANALYSIS OF CARROTS, C.E.F., OTTAWA, ONT., 1905.

Variety.	Water.	Dry Matter.	Sugar in Juice.	Average Weight of one Root.	
	p. c.	p. c.	p. c.	Lbs.	Oz.
White Belgian	87·46	12·54	3·63	1	1
Half Long Chantenay	88·53	11·47	3·64	0	14
Kos Kirches	89·21	10·79	3·44	1	2
Carter's Orange Giant	89·43	10·57	2·02	1	3
Improved Short White	89·65	10·35	2·14	1	7
Ontario Champion	89·82	10·18	2·53	1	1
Mammoth White Intermediate	89·85	10·15	2·95	1	4
Early Gem	90·39	9·61	1·92	0	14
Long Yellow Stump-rooted	90·63	9·37	2·44	1	10
Giant White Vosges	90·96	9·04	1·52	1	3
New White Intermediate	91·35	8·65	1·53	1	4
Average of 11 varieties	89·75	10·25	2·52	1	3

INFLUENCE OF INHERITED QUALITIES.

The composition of roots is influenced by various factors, chief among which are the character of the season as regards rainfall and temperature, and the relative richness of the soil. Quality in roots, however, as evidenced by the percentage of 'dry matter' and sugar is in part inherited. For the past six years we have analysed two varieties, the Gate Post and Giant Yellow Globe grown side by side, on land of the same character and, necessarily, under the same climatic conditions, and the results indicate that 'breed' in mangels is a factor of considerable importance.

DRY MATTER AND SUGAR IN GATE POST AND YELLOW GLOBE MANGELS.

Season of Growth.	Gate Post.		Giant Yellow Globe.	
	Dry Matter.	Sugar in Juice.	Dry Matter.	Sugar in Juice.
	p. c.	p. c.	p. c.	p. c.
1900	11·14	6·15	8·19	2·64
1901	9·41	4·15	9·10	4·08
1902	13·90	9·39	10·24	5·24
1903	12·93	7·38	10·89	6·17
1904	12·64	7·62	9·24	5·26
1905	12·07	6·83	8·64	3·55
Average of 6 years 1900-05	12·01	6·92	9·38	4·49

Though the data for neither of these roots show great regularity or uniformity, due chiefly, I believe, to varying seasonal conditions, a well marked and always present difference is to be observed between these mangels as regards their percentages of dry matter and sugar. We have already observed that the past season at Ottawa was not one favourable to sugar production, and this, I think, may account for the fact that both varieties have given low returns this year. However, this does not affect in any way the general results or the conclusions drawn from previous years' work in this matter, viz., that the Gate Post is the richer of the two, both as to dry matter and sugar. The difference between these varieties, as far as it can be ascertained by chemical analysis, shows that weight for weight the Gate Post should be worth between one-third and one-fourth more than the Giant Yellow Globe for feeding purposes.

SUGAR BEETS, FOR FACTORY PURPOSES.

The three varieties of sugar beets principally used for sugar extraction, Vilmorin's Improved, Klein Wanzleben and Très Riche (French 'Very Rich') as grown on the Dominion Experimental Farms during the past season have been analysed. By reference to the reports of this Division it will be seen that this investigation has been carried on, practically, since the establishment of the Farms, so that now we have on record considerable evidence as to the richness and purity of sugar beets as grown in Canada under varying climatic or seasonal conditions.

SUGAR BEETS GROWN ON THE DOMINION EXPERIMENTAL FARMS, 1905.

Variety.	Locality.	Percentage of Sugar in Juice.	Percentage of Solids in Juice.	Co-efficient of Purity.	Average Weight of one Root.	
					Lbs.	Oz.
Vilmorin's Improved......	Nappan, N.S...........	15·39	18·77	82·0	0	14
"	Ottawa, Ont.............	12·00	15·37	78·1	1	0
"	Brandon, Man...........	10·70	14·43	74·2	1	15
"	Indian Head, Sask......	15·13	17·86	84·7	1	14
"	Agassiz, B.C.............	17·14	21·06	81·3	1	2
Klein Wanzleben	Nappan, N.S............	17·86	20·63	86·5	0	13
"	Ottawa, Ont.............	13·34	13·95	95·6	1	14
"	Brandon, Man	10·57	15·03	70·3	2	12
"	Indian Head, Sask......	16·35	19·28	84·8	1	14
"	Agassiz, B.C............	17·26	19·97	86·5	1	1
Très Riche (French 'Very Rich')	Nappan, N.S............	16·31	19·70	82·3	0	13
"	Ottawa, Ont.............	12·00	14·40	83·3	1	4
"	Brandon, Man	11·99	15·83	75·7	2	12
"	Indian Head, Sask......	13·34	17·26	77·2	1	15
"	Agassiz, B.C............	17·56	20·20	86·9	1	3

The best results have been obtained on the Experimental Farm at Agassiz, B. C., and at Nappan, N.S., closely followed by those at Indian Head. In all three instances the data indicate a good quality of factory beets from which sugar could be profitably extracted.

At Ottawa the percentage of sugar and co-efficient of purity are considerably lower than those usually obtained.

This I believe is due, if not entirely, certainly in a very large measure, to the abnormal climatic conditions that obtained here during the past season. In the first place, the rainfall (13·45 inches) during June, July, and August was somewhat greater than the average. This was followed by a precipitation of 5·31 inches during September and October, an amount not less than usual for these months. In conjunction with this ample supply of moisture we find certain and notable peculiarities of temperature, as follows: Exceptionally high maximum temperatures, and unusually low minimum temperature for the summer months, May, June, July, August, September, and October. This naturally means sudden and great changes in temperature, or in other words, speaking generally, hot days and cool nights. Bearing these facts in mind and remembering that ideal climatic conditions for sugar-production include a moderate and well distributed rainfall during May, June, July, and August, with fairly dry weather in September and October, when the beets are maturing; and, further, that a low mean summer temperature, say 60°F., with few sudden or great changes in the latter part of the season, are specially conducive to a high sugar content, the explanation of the poor results obtained this year is not difficult to find.

At Brandon, Man., the beets are the poorest of the series. This may in part be due to unfavourable weather for sugar accumulation during the ripening of the roots, but the large size to which the beets have grown, considerably over 2 lbs. each in weight, is certainly against a high sugar content.

CHEMISTRY OF INSECTICIDES AND FUNGICIDES.

SODA-BORDEAUX OR BURGUNDY MIXTURE.

During June and July of the present year a number of reports were received, both from Ontario and Quebec, stating that serious injury had resulted from the use of Soda Bordeaux on apples, plums, cherries and peaches—in some instances the trees being entirely defoliated. These communications were accompanied by requests for information regarding this newly introduced mixture, in which washing soda is substituted for lime.

Soda-Bordeaux, which has been used successfully on potatoes for blight and rot, may be prepared according to one or other of the following formulæ:—

	A.	B.
Copper sulphate (Blue stone)	6 lbs.	4 lbs.
Carbonate of soda (washing soda).	7½ "	5 "
Water.	40 gals.	40 gals.

The proportion of bluestone to washing soda is the same in each, but 'A' is naturally the stronger spray.

Though, as far as the writer can learn, Soda-Bordeaux mixture had not been suggested for fruit trees, its use being mainly for potatoes, there appeared no reason why it should prove injurious for orchard work. The explanation was furnished, when upon further inquiry it was learnt that in every authenticated case in which injury had been reported, Paris green, white arsenic or some other arsenical compound had been added to the mixture. When Paris green is added to ordinary (lime) Bordeaux it is not dissolved, but remains in suspension, and experience has shown that no injury to foliage or fruit results from the use of such a spray. When, however, Paris green is added to Burgundy mixture it is partly dissolved (owing to the excess of washing soda present) and becomes an active arsenical compound more or less corrosive to foliage. It has long been known that soluble arsenical compounds have this injurious effect and that consequently they cannot be used in insecticidal mixtures. Paris green, arsenite of soda, and white arsenic were all reported as having been added to the Burgundy mixture; all of these would render the spray extremely injurious.

As it seemed desirable to furnish experimental proof on this subject and since certain correspondents claimed that Burgundy mixture containing Paris green had been used with impunity on fruit trees, a series of trials were made in the orchards of the Experimental Farm, Ottawa, on apples, cherries and plums. In the absence of the Horticulturist, these experiments were planned and carried through by myself. The spraying mixtures were as follows:—

'A'—SODA-BORDEAUX.

Copper sulphate (bluestone).	4 lbs.
Carbonate of soda (washing soda).	5 lbs.
Water.	40 gals.

The bluestone and washing soda were dissolved separately in half the total volume of water and the resultant solutions mixed. This mixture, it will be observed, contains no Paris green or arsenic in any form.

'B.'—Soda-Bordeaux, as above, but to which 4 ounces of Paris green had been added.

'C.'—Soda-Bordeaux, as above, but to which a solution of arsenite of soda (formed by boiling 8 ounces white arsenic and 2 lbs. washing soda with 1 gallon of water) had been added.

RESULTS AND CONCLUSIONS.

Soda-Bordeaux.—(Spray 'A'):—After two sprayings there was no apparent injury to the foliage of apples, plums and cherries.

Soda-Bordeaux with Paris green.—(Spray 'B'):—Leaves of apple slightly scorched at edges. Varieties were found to differ in their resisting power to the corrosive action of this spray, but the results indicate that its use would be attended with a considerable degree of danger in the apple orchard.

The foliage of plums was decidedly scorched, though the injury was not very serious.

The cherries used in the experiment had their foliage slightly scorched. It was evident that this spray could not be used on the cherry with safety.

Soda-Bordeaux with Arsenite of Soda (Spray 'C').—This mixture caused excessive injury on apples, plums, and cherries. The foliage in every instance was scorched, subsequently becoming crisp and falling off. The damage was such as to show conclusively that this spray is dangerous in the highest degree for all classes of fruit trees.

In a word, Burgundy mixture, pure and simple, has shown itself as far as our experiments have gone, to be non-injurious to foliage. The addition of Paris green or other arsenite, however, renders the spray corrosive and therefore dangerous for orchard use.

When it is desired to use Paris green as an insecticide in the spray only Bordeaux mixture made with lime should be employed.

NEW FORMS OF KEROSENE EMULSION.*

The desirability of obtaining emulsifying materials other than the solution of whale oil or soft soap, materials that would not only lessen the expense of the spray, but at the same time obviate the necessity of the application of heat, led Professor Close, of the Delaware Experiment Station, to experiment with lime as an agent to hold the kerosene in suspension. This Lime-kerosene emulsion, prepared according to directions, is very fairly stable, homogeneous, one easy to spray and one which does not clog the nozzle. Briefly described, Prof. Close's directions are as follows: Mix into a 'thin,' sloppy mass 1 lb. of Limoid (an American preparation for the purpose) or the same quantity of good, freshly slaked lime with 1 quart of kerosene. For an approximately ten per cent emulsion, two gallons of water (Imperial measure) are then added and the whole emulsified by churning, say, for 5 minutes, best effected by means of a pump and a coarse nozzle. No free kerosene, he states, will appear for several weeks, and though there may be a separation on standing into limey layers, these will readily, if stirred, again produce the emulsion without deterioration.

Lime Emulsion.—Since 'Limoid' was specially recommended and was not obtainable in Canada, and numerous inquiries were being received as to the value of lime for this purpose, a number of experiments were made in the farm laboratories from the results of which the following important conclusions were drawn.

1. Freshly slaked lime makes a smoother and more lasting emulsion than ordinary air-slaked lime—the latter, however, will make a satisfactory emulsion if it is not too much carbonated by long exposure to the air.

2. By employing lime slaked immediately before using, the quantity may be materially reduced. A perfect emulsion can be made by slaking ½ lb. of good quick lime and emulsifying with 1 quart of kerosene and 2 gallons of water. This makes an approximately 11 per cent emulsion, suitable for Aphis.

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*This investigation was made at the suggestion and with the co-operation of Mr. W. T. Macoun, the Horticulturist, to whom my thanks are due for much valuable advice and assistance.

3. By the use of freshly slaked lime less time is needed for the churning in order to bring the mass to a perfect emulsion. Two to three minutes of vigorous, continuous pumping were found sufficient.

4. It is not apparently a matter of much moment that the lime be dry when mixed with the kerosene. Excellent emulsions have been made when the slaked lime has been quite moist or even made into a thick cream with water before adding the kerosene.

Flour Emulsion.—It occurred to the writer that as good quicklime was not always obtainable at a moment's notice, it would be well to ascertain if flour—to be had everywhere—would not answer equally well. Our experiments showed that flour could be successfully substituted for lime in making the emulsion when desired for immediate use. One pound to 1 quart of kerosene makes a perfect emulsion, as in the case of the lime, but 8 ounces were subsequently found sufficient to hold in perfect suspension the quart of kerosene.

The preparation with flour is very simple. The requisite amount of kerosene is placed in the vessel (pail or barrel), which is preferably dry, and flour added in the proportion stated, viz.: 8 ounces to 1 quart, the mass thoroughly stirred and the water added—2 gallons for every quart of kerosene. This is then vigorously churned, as already described, say, for 5 minutes, and the emulsion is ready for use.

It was further found that by scalding the flour a less weight is required. An excellent emulsion which did not show the slightest separation of kerosene after one week was prepared by scalding 2 ozs. of flour, mixing the resulting thin paste with 1 quart of kerosene and emulsifying with 2 gallons of water.

The flour emulsion is smooth, easily atomized, and does not clog the nozzle. Any separation into layers may be easily remedied by simply stirring or shaking the mixture. It is equally effective, we believe, as an insecticide with the lime-formed emulsion, and amongst other advantages that may be claimed for it is the fact that there is no perceptible whitening of the foliage, and, further, that in some places it will be found cheaper and easier to make than the lime emulsion. Its use is suggested as an alternative when good lime is unobtainable—when the emulsion is for immediate use and when intended for ornamental trees and shrubs, upon which the whitening of the foliage is objectionable.

FORMALIN—FORMALDEHYDE 40 PER CENT.

The amount of Formalin used in the treatment of grain, especially wheat and oats, for the prevention of smut, increases yearly and very rapidly. In Manitoba and the North-west generally it has already very largely replaced bluestone, due no doubt in a measure to the ease with which the solution may be prepared—simple dilution being all that is necessary. The results of the Formalin treatment have been highly satisfactory, and there is ample proof that Formalin is a most efficient smut destroyer. It has been used in two strengths: 3 ozs. to 10 gallons (2 parts in 1,000), and 4½ ozs. to 10 gallons (3 parts to 1,000). The seed grain is either thoroughly sprinkled or immersed for 5 minutes. In the majority of cases, and save perhaps with very badly affected grain, the weaker solution has proved as effective as the stronger, and thorough sprinkling equally satisfactory with immersion. In addition to ascertaining the strength of several brands of formalin on the market, we have endeavoured this year to learn if formalin, which had become milky through age, had lost its efficiency, wholly or in part, and if such altered (polymerized) formalin injuriously affected the germ of the grain. These were questions asked by several correspondents in the North-west last spring. A further enquiry was as to the effect of the formalin treatment on the vitality of wheat as compared with that of bluestone.

ANALYSIS OF FORMALDEHYDES.

	Percentage of Formaldehyde by weight.
No. 1. From Fulford-Leonard Drug Co., Brandon, Man. (clear).	38·0
No. 2. From Halpins Drug Store, Brandon, Man. (clear).. ..	38·9
No. 3. From Clement Drug Store, Brandon, Man. (milky through polymerization)..	38·7
No. 4. From Fleming's Drug Store, Brandon, Man. (milky through polymerization)..	38·9
No. 5. From Cereal Division, C.E.F..	38·5
No. 6. From The Chemists and Surgeons Supply Co., Montreal.	37·9
No. 7. Scherings Formalin, very old and badly polymerized sample..	46·4
No. 8. Scherings Formalin, very old and badly polymerized sample	34·4

These results, generally, are slightly higher than those obtained in 1903. Though it is not advisable to draw hard and fast conclusions from a few samples, the data indicate that there is considerable uniformity in strength among the brands found upon the market. Samples No. 7 and 8 were taken from the same bottle, which had been in the Farm Laboratory for more than 5 years; the formalin had become quite pasty through polymerization. The thinner portion gave 34·4 per cent; the thicker 46·4 per cent formaldehyde.

Slight polymerization, as in samples 3 and 4, does not apparently affect the analytical determination; excessive polymerization evidently interferes with the estimation.

So far our analyses have not detected any wilful adulteration or material falling off in strength.

ACTION OF FORMALIN ON THE VITALITY OF WHEAT.

For this purpose we used two samples of Red Fife wheat kindly furnished by Mr. Bedford, Superintendent of the Experimental Farm, Brandon, Man. He writes:—

'The 1904 sample is very smutty and is also badly rusted. Some think that rusted grain is so weak in germination that formalin or bluestone will kill the germ and for that reason do not treat it for smut. Information as to this will be gratefully received by western farmers. The 1902 wheat has not so much smut and is not rusted.' In the following table the treatment of these wheats is detailed, together with the results of the vitality test.

	Percentage of Vitality.	
	1902. Wheat.	1904. Wheat.
Untreated....	91	98
Formalin, fresh, 4½ ozs. to 10 gals....	66	86
" polmerized, 4½ ozs. to 10 gals..	71	92
" fresh, 9 ozs. to 10 gals....	69	72
Bluestone, 1 lb. to 2½ gals....		63

(The treated wheats were immersed for 5 minutes, dried by exposure to the air, and tested at once as to vitality).

The results, it must be admitted, are not altogether satisfactory; the work must be repeated before any final conclusion can be reached and any definite statement made on several of the points under discussion. There are one or two deductions, however, that I think may safely be made, as follows:—

The formalin treatment lowers the percentage of vitality; the effect being more noticeable on the older (1902) wheat. In one instance the stronger solution (9½ ozs. to 10 gals.) reduced the vitality to a greater degree than the weaker solution; further work will probably confirm this result. Investigations carried on in the Farm laboratory in 1890-93 showed that bluestone similarly affected the vitality of the wheat; the stronger the solution, the more injury to the grain germ.

Milky or slightly polymerized formaldehyde is apparently less injurious to the germ than the fresh material, but it is only with the 1904 wheat that the difference is well marked.

Some years ago, the writer showed that bluestone *continues* to act injuriously upon the germ of the wheat, and therefore, that it was highly desirable that the grain should be sown as soon as possible after treatment. The same is no doubt true in the case of the formalin treatment. In this connection, Dr. Chas. E. Saunders, Cerealist, C.E.F., has furnished me with some valuable data that he recently obtained. He states that in the case of wheat, oats, and barley, the seed being treated with formalin solution 9 ozs. to 10 gallons, the vitality of the treated grains was after 11 months found to have been entirely destroyed. To study further this 'after effect' of formalin, samples of the treated wheats have been preserved and will be examined from time to time as to vitality.

It is of interest to note that the formalin treatment was not so severe on the life of the germ as the bluestone solution. It is quite possible, of course, that a more dilute solution of bluestone, say, 1 lb. to 5 gallons, would have been equally efficacious in destroying smut and less injurious to the wheat.

It does not appear that the vitality of the wheat (1904) had been impaired or weakened by the rust. It is not, therefore, advisable to neglect the treatment of grain simply on the count that it is rusted.

MILKY (POLYMERIZED) FORMALDEHYDE AS A SMUT PREVENTIVE.

In order to ascertain the relative values of the various treatments in smut prevention, samples of these treated grains (with the exception of those from the solution 9 ozs. to 10 gallons) were sent to the Experimental Farm at Brandon, Man., to be sown. They were sown in rows 6 inches apart and 30 inches long. Under date of August 28 Mr. Bedford writes: 'I have carefully gone over all the grain you sent me for smut test and I find that there are 159 smutty heads in the lot marked '1904, untreated,' but not a solitary smutty head in any of the others."

From this it might be concluded that all the treatments had been equally efficacious. There is this unsatisfactory feature, however, about the results, that the untreated 1902 sample, which contained a slight amount of smut, gave no sign of smut in the plot.

Slight polymerization of the formalin, as indicated by milkiness, does not apparently materially affect the virtue of the material for the destruction of smut, but it will be necessary to repeat this work another season before making any definite statement on this point.

CYANIDE FOR FUMIGATION PURPOSES.

It is a matter of considerable importance that the quality or strength of the cyanide used in the fumigation of plants and shrubs for the destruction of the San José scale should not fall below that called for. The value of this chemical so used is entirely dependent upon the amount of hydrocyanic acid gas evolved on the addition of acid.

The examination of a number of samples of 'potassium cyanide' in 1902, showed that at that time considerable differences in strength, *i.e.*, hydrocyanic acid content, existed between the various brands upon the market. It was, further, made clear that much of the so-called potassic cyanide was sodic cyanide. From the standpoint of an insecticide, however, this latter fact has no significance, the percentage of hydrocyanic acid alone, as has been stated, determining the value of any particular sample.*

Last March two samples, submitted by the Entomological Division, were examined, the analysis furnishing the following data:

	Hydrocyanic acid, Per cent.
'A.' 'Pot cyanide 98-100 per cent,' as supplied to St. John N.B. Fumigation Station, 1904..	36·41
'B.' 'Cyanide of potash, C.P.', Henderson Bros., Lt..	42·71

Analysis showed 'A' to be practically potassium cyanide: sample 'B' contains no potassium and is exclusively sodium cyanide. The values of these samples are indicated by the percentages of hydrocyanic acid stated; in other words, 100 ounces of 'B' are equivalent to 117 ounces of 'A' in gas producing power.

WELL WATERS FROM FARM HOMESTEADS.

The examination of well waters from farmers has proved one of the most popular and directly useful features of our work. The danger that exists when the water supply is polluted is now widely known and every year finds a larger proportion of our rural population impressed with the fact that there is a very real and intimate relationship between good water and good health.

As we have shown again and again, the barnyard and back door wells are the sources above all others to be feared. Such are a dangerous convenience and not infrequently the cause of much ill health in the farmer's family. Every phase of the pure water question has, however, been discussed fully in past reports, and it only seems necessary to add now that assistance will continue to be given in this matter of water analysis to farmers and dairymen desiring it. We cannot, however, undertake water analyses for municipalities, villages, and towns. Requests for such work should be referred by the local health authorities to the Provincial Board of Health.

Instructions for the collection and shipment of water samples are forwarded on application.

Of the 118 samples of water received during 1905, 83 were submitted to analysis. the remainder being rejected by reason of insufficient quantity, dirty containing vessels or corks. By grouping the results of those examined, we find that 22 were reported as safe and wholesome, 38 seriously polluted, 12 suspicious and probably unsafe for drinking purposes, and 11 saline in character.

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* See page 151 et seq. Report of the Chemist of the Experimental Farms for 1902.

ANALYSES OF WELL WATERS, 1905.

RESULTS STATED IN PARTS PER MILLION.

Number.	Locality	Marks.	Date.	Free Ammonia.	Albuminoid Ammonia.	Nitrogen in Nitrates and Nitrites.	Chlorine.	Total Solids at 105° C.	Solids after Ignition.	Loss on Ignition.	Phosphate.	Report.
			1904.									
1	Calgary, Alta..........	T. A..........	Dec. 5	·275	2·0	·73	5·0	592·0	364·0	228·0	....	Unsafe to use for drink'g purposes.
			1905.									
2	Carstairs, Alta.	Dr. A. R	Jan. 3	·135	·382	·078	8·0	692·0	516·0	176·0	V. hvy. trs.	Very suspicious.
3	Carleton Place, Ont.....	W. B. McA....	" 11	Free.	·085	2·561	8·0	319·2	269·6	49·6	Slight trcs..	Suspicious.
4	Rouleau, Assa..........	W. H. J.......	" 16	·09	1·38	33·72	200·0	8937·0	7966·0	971·0	....	Strongly saline.
5	Longlaketon, Assa......	W. L. W.... .	" 23	·04	·08	·245	9·0	719·2	553·6	165·6	None....	Free from pollution.
6	Medora, Man...........	A. N. M.......	Feb. 20	4·70	·625	None.	801·0	4676·0	4341·2	334·8	"	Saline water.
7	Lefroy, Ont	W. R..........	" 24	·01	·155	·42	6·1	242·0	147·2	94·8	"	Fairly good water.
8	Salisbury, N.B.........	P. J. G	" 24	·192	·330	·212	92·5	542·0	390·0	152·0	Slight trcs..	Dangerously polluted.
9	Salisbury, N.B	J. W. P.......	" 24	None.	·294	3 963	23·5	240·0	155·0	85·0	V. hvy. trs.	Very suspicious.
10	Morrison Lake, Ont....	C. H	Mar. 10	·65	·30	....	None.	113·0	58·0	55·0	None.......	Rather suspicious.
11	Lennoxville, Que.......	F. W. F..... .	" 16	None.	·13	·055	None.	111·2	69·6	41·6	"	Wholesome.
12	Balmoral, Ont..........	G. H. R.......	Apr. 10	1·59	2·46	2·45	38·0	1187·0	834·0	243·0	Heavy trs..	Very seriously polluted.
13	Calumet, Que..........	R. L...	" 11	None.	·05	None.	2·5	255·2	217·2	38·0	None.......	Perfectly safe and wholesome.
14	Rockliffe, Ont...	W. H S.....	" 20	·06	·06	16·61	22·0	407·2	314·4	92·8	Heavy trs..	Seriously contaminated
15	Campbell's Bay, Que....	E. H. W.......	" 22	Free.	·285	7·20	32·0	550·8	414·8	136·0	Free........	Contaminated with drainage mat'r.
16	Ottawa, Ont...........	G. C. E	" 29	Free.	·10	4·61	16·25	310·0	224·8	85·2	"	Suspicious.
17	Meach's Lake, Ont	N. J. K.......	May 2	·01	·295	·0082	....	68·4	38·4	30·0	None.......	Unpolluted.
18	Pile Hill, Assa.........	W. M. G......	" 2	·016	·88	8·668	65·0	2855·6	2171·2	684·4	Heavy trs..	Strongly saline.
19	Sutton, Que...........	A. G. E. No. 1.	" 6	·01	·095	·758	Free.	29·6	20·0	9·6	Free........	Pure and wholesome.
20	" "	A. G. E. No. 2.	" 6	·01	·115	1·62	Free.	54·0	32·4	21·6	"	" "
21	Lennoxville, Que........	H. A...... ...	" 16	·008	·235	·059	None.	132·0	96·8	35·2	Traces..	Excellent water.
22	Broomhill, Man.	W. K.........	" 25	·008	·208	·059	1·0	387·2	283·2	104·0	None.......	Unpolluted with drainage.
23	Murray Harbor South, P.E.I.	W. S. H. No. 1.	June 2	·03	·268	11·264	98·0	416·8	344·0	72·8	Traces.. ..	Seriously polluted.
24	" " "	" " 2.	" 2	1·62	·757	1·352	190·0	1126·8	775·6	351·2	Heavy trcs.	" "
25	" " "	" " 3.	" 2	·048	·075	22·517	60·0	213·6	148·0	65·6	....	" "
26	Calgary, Alta..........	J. S. D.......	" 6	Free.	·425	Free.	14·5	3047·6	2461·6	286·0	Free........	Saline water.
27	Meadowvale, N.S......	M. S.	" 12	·01	·095	2·255	7·8	66·4	26·8	39·6	Traces.. .. .	Rather suspicious.
28	Balaclava, Ont.........	J. E.........	" 20	·215	·270	·523	7·5	412·0	308·0	104·0	"	Dangerously polluted.

ANALYSIS OF WELL WATERS, 1905—*Concluded.*

Number.	Locality.	Marks.	Date.	Free Ammonia.	Albuminoid Ammonia.	Nitrogen in Nitrates and Nitrites.	Chlorine.	Total solids at 105° C.	Solids after Ignition.	Loss on Ignition.	Phosphates.	Report.
			1905.									
29	Cascades, Que	F. F. D.	July 17	None.	·1167	2·475	1·2	88·0	24·0	64·0	None	Quite safe for drinking purposes.
30	Penhold, Alta	J. S.	" 19	·26	·23	None.	10·0	1112·0	972·8	139·2	"	Rather suspicious.
31	St. Stephen, N.B.	C. M. V. No. 1.	" 19	None.	·16	25·6	123·0	638·4	515·2	123·2	"	Dangerously polluted.
32	"	" No. 2.	" 19	"	·02	·14	5·8	41·6	24·8	16·8	"	Free from pollution.
33	St. Victor d'Alfred, Ont.	W. G	" 22	8·425	·98	·374	15204·4	12416·0	2788·4	8000·0	Heavy trace.	Saline water.
34	Pointe de Bute, N.B.	C. F	" 22	·18	·225	·326	5·0	50·0	18·0	32·0	None	Seriously contaminated.
35	Indian Head, Sask	R. M. B.	" 29	·665	·71	2·818	800·0	8434·0	6399·0	2035·0	Trace.	Saline water.
36	Maitland, N.S.	G. L. S.	Aug. 10	Free.	·04	·823	7·0	856·0	676·0	180·0	Traces	Suspicious.
37	Cassel, Ont.	H. B.	" 21	·17	·07	·09	2·8	514·8	400·8	114·0	"	"
38	Disley, Assa	W. T. A.	" 24	·29	1·44	1·103	365·0	13840·4	10987·2	2853·2	None	Saline water.
39	Ingonish, N.S	H. C. C	" 28	·235	·06	·07	25·0	2377·6	1910·0	467·6	Slight trace.	"
40	Mather, Man.	J. A. F.	" 29	4·355	·415	1·062	320·0	5950·0	4644·0	1306·0	Traces	"
41	Ottawa East, Ont.	J. B. No. 1	" 31	·67	·215	·346	2·8	200·0	140·0	60·0	Trace.	Seriously polluted.
42	"	" No. 2.	" 31	·01	·185	·37	1·5	196·4	107·6	88·8	Free	A good water.
43	Ottawa, Ont.	N. J. K. No. 1.	" 31	·01	·22	·1	·6	62·9	36·4	26·5	V. S. trace.	Free from contamination.
44	"	" No. 2.	" 31	·01	·215	·115	·6	59·6	34·4	25·2	"	" "
45	"	" No. 3.	" 31	·01	·22	·107	·5	56·0	36·0	20·0	"	" "
46	"	" No. 4.	" 31	·01	·255	·108	·6	57·6	32·4	25·2	"	" "
47	Ottawa East, Ont.	J. B. No. 1	Sept. 5	·65	·225	·292	2·5	227·6	153·6	74·0	"	Unfit for drinking purposes.
48	"	" No. 2,	" 5	·635	·205	·416	2·5	206·4	134·4	72·0	Slight trace.	" "
49	Cheneville, Que.	J. F.	" 8	·42	·26	3·42	14·5	135·0	92·0	43·0	Trace.	Seriously polluted.
50	L'Ange Guardien, Que.	F. A.	" 9	None.	·45	3·23	1200·0	2848·0	2555·0	293·0	V. H. trace.	Saline water.
51	Brooklin, Ont.	H. B.	" 14	·01	·16	1·45	39·5	497·6	310·0	187·6	Traces	Very suspicious.
52	Kingsmere, Ont.	J. G. G. No. 1.	" 20	None.	·07	1·54	·25	134·0	76·4	57·6	"	Free from pollution.
53	"	" No. 2.	" 20	"	·22	·813	·66	36·0	....	....	None	Excellent water.
54	Summerside, P.E.I.	J. S. A.	" 21	·04	·095	8·71	52·5	412·4	318·4	94·0	Traces.	Very suspicious.
55	Enderby, B.C	G. H. No. 1.	" 26	None.	·16	None.	None.	280·0	176·0	44·0	V. S. trace.	Wholesome.
56	"	" No. 2.	" 26	·39	·185	"	12·0	1392·0	1104·0	288·0	Traces	Seriously polluted.
57	"	" No. 3.	" 26	·01	·095	·012	4·0	673·0	453·0	218·0	None	Excellent water.
58	Richmond, Ont.	W. A. H.	" 29	·20	·14	1·111	50·0	524·0	300·4	223·6	Traces	Seriously polluted.
59	Edmundston, N.B	C. G. M.	Oct. 2	Free.	·185	·0823	1·0	72·8	35·2	37·6	None	Free from pollution.
60	Panmure, Ont	T. O'K.	" 5	·195	·135	None.	41·0	472·0	399·0	73·0	"	Contaminated.
61	Carleton Place, Ont.	M. A. McF.	" 7	Free.	·095	3·08	12·75	325·2	225·6	99·6	Heavy trace.	Probably contaminated.
62	Cobden, Ont.	T. B	" 12	·09	·17	10·22	155 0	1031·2	529·6	501·6	Traces	Extremely bad water.
63	"	R. A. B.	" 12	·01	·195	9·61	20·0	402·8	248·4	154·4	"	Unfit for drinking purposes.
64	"	J. A.	" 12	·03	·13	12·15	202·5	1025·2	661·2	364·0	Heavy trace.	Very seriously polluted.

65	"	Dr. McL.	"	12	·13	·11	4·19	31·0	428·0	248·0	180·0	Traces	Dangerously polluted.
66	"	A. McB	"	12	·135	·185	45·32	182·5	1180·0	681·6	498·4	Heavy trace.	Extremely bad water.
67	Port Perry, Ont.	J. W.	"	16	·215	·38	·0618	118·0	794·4	562·4	232·0	Traces	Exceedingly bad water.
68	Alexander, Man	A. G. G.	"	19	·87	1·19	·214	132·5	20603·0	15885·0	4718·0	Heavy trace.	Saline water.
69	Cobden, Ont	J. M. C.	"	27	·06	·255	6·905	60·0	....	....	....	....	Seriously polluted.
70	"	R. A.	"	27	·08	·06	·098	5·0	....	....	....	....	Unpolluted.
71	"	J. P.	"	27	·04	·37	33·15	210·0	....	....	....	....	Seriously polluted.
72	"	A. McD.	"	27	·11	·40	28·07	150·0	....	....	....	....	"
73	"	C. B. M.	"	27	Free.	·055	15·77	40·0	....	....	....	....	"
75	"	W. B. D.	"	27	·05	·28	40·95	110·0	....	....	....	....	"
76	"	C. L. T.	"	27	·02	·24	43·63	210·0	....	....	....	....	"
77	"	J. H.	"	27	·05	·25	28·61	45·0	....	....	....	....	"
78	"	F. S.	"	27	·044	·105	36·86	110·0	....	....	....	....	"
79	"	A. McL.	"	27	Free.	·11	17·29	25·0	....	....	....	....	"
80	"	W. B.	"	27	·215	·24	38·12	110·0	....	....	....	....	"
81	"	E. T	"	27	Free.	·24	39·15	150·0	....	....	....	....	"
82	Fallowfield, Ont	J. M.	Nov.	3	·13	·225	9·313	17·0	434·8	320·8	114·0	Traces	Seriously contaminated.
83	Rockliffe, Ont	R. H. C. No. 1.	"	23	·22	·18	3·92	7·0	282·8	164·8	158·0	Heavy trace.	Seriously polluted.

REPORT

OF THE

ENTOMOLOGIST AND BOTANIST

(James Fletcher, LL.D., F.L.S., F.R.S.C.)

1905.

Ottawa, December 1, 1905.

Dr. William Saunders, C.M.G.,
Director of Dominion Experimental Farms,
Ottawa.

Sir,—I have the honour to hand you herewith a report on some of the most important subjects which have been brought officially under my notice during the past season.

There is a satisfactory and ever increasing evidence of the appreciation of the value of the investigations carried on by the officers of the Division. This is indicated by the large number of letters received from farmers, fruit growers and others in all parts of Canada and by the constant demand for the services of the officers at various meetings.

The work of the Division has been during the past year of the same nature as that of previous years. Investigations have been continued of the life-histories of various insect pests, together with practical tests of the most effective remedies. In the botanical branch, the experiments with fodder plants of all kinds have been carried on as heretofore and have proved of great interest to visitors. The past season in the Ottawa district was particularly propitious for the development of grasses, clovers and other fodder plants. As some of the old plots had gradually become unproductive, it was thought well to plough up one-third of the experimental grass garden and clean it by sowing to rape. This was done early in July, and at four successive dates portions were sown and notes kept upon the crops. Next year another third of the grass garden will be treated in the same way and that part cleaned this year will be again used for grass plots. The following year the remainder will be treated.

Correspondence.—The correspondence of the Division has again during 1905 shown a considerable increase in the number of letters both received and despatched. From December 1, 1904, to November 30, 1905, the number of letters, exclusive of circulars, registered as received was 3,406 and the number despatched 3,291.

Meetings attended.—Meetings of farmers' institutes and agricultural associations of various kinds have been attended whenever other official duties would allow of absence from Ottawa.

December 7 to 9, 1904: Windsor, N.S.—The Fruit Growers' Association of Nova Scotia: 'Insects Injurious to Fruits in Nova Scotia.'

December 12: Amherst, N.S.—Maritime Winter Fair: 'Insects Injurious to Live Stock.'

December 29: Philadelphia.—Association of Economic Entomologists and Society for the Promotion of Agricultural Science, Annual meetings: 'Injurious Insects of 1904 in Canada'; 'A destructive Ptinid new to North America.'

February 3, 1905: Guelph.—Address before the students of the Agricultural College on 'Methods in Nature Study.'

February 4: Toronto.—Address on Nature Study and Natural History before Toronto University (Saturday afternoon Popular Lecture).

May 26: Ottawa.—Union Teachers' Convention: 'The Use of Insects in Nature Study.'

May: Ottawa.—Two addresses before the Normal School; 'Nature Study—Birds.'

June 6: Toronto.—Address before Toronto Horticultural Society on 'Insect Pests and How to Exterminate them.'

June 7: Hamilton, Ont.—Hamilton Horticultural Society: 'The Gardeners' Insect Enemies in June.'

June 8: Guelph.—Ontario Agricultural College: 'What the Experimental Farms are doing for Canada.'

June 8: Guelph.—Macdonald Institute: 'The True Place of Nature Study in Education.'

June 30: Ottawa.—Dominion Seed Growers' Association: 'Co-operation between Seed Grower and Entomologist.'

June 27: Ottawa.—Ottawa Horticultural Society: 'What Plants do.'

July 5 and 10: Ottawa.—Two addresses on Birds before Ottawa Normal School, Summer School of Science.

July 13 and 14: Ottawa.—Two addresses on Insects before Summer School of Science, Ottawa.

August 21 to Sept. 23.—Manitoba, North-west Territories and British Columbia: Holding meetings, making investigations and inspecting Fumigation Stations.

October 18 and 19: Guelph.—Attending Annual Meeting of the Entomological Society of Ontario: 'Injurious Insects of Ontario, 1905'; 'Entomological Record, 1905.' At this meeting a paper was also read by Mr. Arthur Gibson upon 'Injurious Insects of the Flower Garden.'

Mr. Gibson also attended the County of Carleton Annual Exhibition at Richmond on September 26, and judged the Natural History exhibits made by the school children of the county. These exhibits were on the whole satisfactory and showed careful work, particularly on the part of the teachers.

Collections.—The collections of insects and plants in the Division have been largely increased during the past year. Mr. Gibson, who has charge of the insect cabinets, has mounted and placed a large number of specimens. The collection of lepidoptera is now in excellent working order. Efforts will be made to build up the reference collections of the other classes of insects as quickly as possible, as information is being constantly sought for from the Division by the large number of students in all parts of the Dominion who are giving so much attention to Nature Study. Mr. Guignard has also added several hundred sheets of mounted plants to the herbarium and a large number of defective specimens have been replaced by better. Several valuable donations have been received from correspondents, of which the following are worthy of special mention:

Anderson, J. R., Victoria, B.C.—Many specimens of rare British Columbian plants.

Bilodeau, Arthur, Ottawa University.—Botanical specimen of *Hieracium murorum.*

Bush, A. H., Vancouver, B.C.—Some rare and much desired British Columbian lepidoptera.

Cockle, J. W., Kaslo, B.C.—Eggs and larvæ of interesting mountain lepidoptera.

Criddle, Norman, Aweme, Man.—Several rare western plants and moths; also seeds of weeds.

Denny, Edward, Montreal.—A beautiful series of *Apantesis vittata,* and living larvæ.

Dod, F. H. Wolley, Hillarville, Alta.—Eggs of rare western lepidoptera.

Dupret, Rev. Father H., Montreal.—Botanical specimens of the rare orchid *Epipactis viridiflora,* found at Montreal; and of *Sibbaldia procumbens,* from Mount St. Hilaire, Que.

Fraser, George, Ucluelet, B.C.—Several living plants of western ferns and other rare species of British Columbian plants, including *Apargidium boreale,* first found in Canada by Mr. Fraser.

Freeborn, J. J., Dundas, Ont.—Several samples of interesting seeds.

Gellatly, D., Gellatly, B.C.—Seeds of cut-leaved variety of *Sambucus melanocarpa* and *Ribes viscosissimum,* and specimens of the fungi which are stored by the mountain squirrels as food in winter.

Harrington, W. H., Ottawa.—Several specimens of rare Ottawa plants, some of them new to the Ottawa list.

Harvey, R. V., Vancouver, B.C.—Two specimens of *Thecla johnsoni,* a new species recently described from British Columbia; also named specimens of rare flies and other insects.

Keen, Rev. J. H., Metlakatla, B.C.—Specimens of unmounted lepidoptera.

Marmont, L. E., Rounthwaite, Man.—Larvæ of *Apantesis incorrupta* and specimens of several species of moths.

Miller, H. H., Guelph, Ont.—A beautiful collection of mounted specimens of the principal weeds with their seeds, prepared specially for seedsmen and showing all species mentioned in the Seed Control Act, 1905.

Perrin, Jos., MacNab's Island, Halifax, N.S.—A series of local forms of *Satyrus alope* and a pair of *Argynnis aphrodite.*

Stoker, Mrs., Cowichan Lake, B.C.—A collection of seeds of 130 species of British Columbian wild plants.

Venables, E. P., Vernon, B.C.—Noctuid moths from the Okanagan valley.

Willing, T. N., Regina, N.W.T.—Specimens of western moths and botanical specimens from various localities in the North-west Territories.

Young, C. H., Hurdman's Bridge, Ont.—A collection of specimens of beautifully mounted microlepidoptera, all taken at Ottawa.

I have the honour to be, sir,

Your obedient servant,

JAMES FLETCHER,

Entomologist and Botanist.

DIVISION OF ENTOMOLOGY.

CEREALS.

Cereal crops in all parts of the Dominion have been heavy and of excellent quality in 1905. The unprecedented crop of about 85 millions of bushels of wheat in Manitoba and the North-west has bountifully confirmed the sanguine anticipations of those who justly have such confidence in the Great West. Oats, barley and other grains have been equally satisfactory with the staple crop, wheat. There has been an enormous increase over 1904 in the amount of fall wheat harvested in the rich lands of south-western Alberta. Weather conditions, although such as to cause considerable anxiety at times, from cool weather during growth, with frequent rains, proved to be most propitious for the production of high quality grain. The long open autumn allowed the enormous crop to be safely garnered.

There were few adverse influences. Rust, although locally present, had little effect on the main crop. Two weeks of hot weather just before harvest caused the grain to ripen up all at once and rather prematurely; but Mr. Willing writes at the end of the season: 'Weeds were too abundant in many places, but I have heard of no serious damage to grain crops by pests except in the early part of the season, by cutworms in Alberta and parts of Assiniboia.' In Ontario, 'while a majority of correspondents describe fall wheat as of good quality, some speak of the grain as being rather shrunken and light in weight.' 'Very little harm to the crop was reported from Hessian Fly or other insects.' (Ontario Crop Report No. 90, for Nov. 1905). In Quebec, crops were well up to the average. In New Brunswick a protracted summer drought in some parts reduced crops of all kinds, but early sown wheat threshed out a good yield.

In Nova Scotia the Secretary of Agriculture writes: 'On the whole, I think the province may be congratulated upon having received a bountiful harvest. Hay, oats, wheat and potatoes are the most important crops and have reached a high average.' In Prince Edward Island Rev. A. E. Burke reports: 'No rust of any account on grain. Wheat, oats and other grains, a bumper crop. In a very restricted circle Hessian Fly and Joint Worm attacked the wheat.' Prof. Readey writes in the August Crop Report: 'The wheat crop is above the average. In the vicinities of New London, Stanley Bridge and Cavendish, the wheat Joint Worm is reported as doing considerable damage.'

THE HESSIAN FLY (*Cecidomyia destructor,* Say).—There is little mention of injury by the Hessian Fly in Ontario during 1905, although in Prof. James's November Crop Report it is stated that a few complaints were sent to his Department; but in no case was there serious damage. Slight attack was also noticed in Prince Edward Island. A rather more considerable injury to the spring wheat crop occurred in Manitoba. Several correspondents estimate the loss at about 5 per cent. All evidence so far at hand indicates that the Hessian Fly in Manitoba is single-brooded, a fortunate fact in this country, where such a large area is devoted to wheat. In Alberta there has recently been an enormous increase in the acreage devoted to fall wheat; and, fortunately, up to the present time, no trace of the Hessian Fly has been found in that province. It will be well, however, for the fall wheat growers in the country to the south of Calgary to be on the look out for this insect and be prepared to adopt the methods of controlling it which have been so successful in the older provinces. Reports of the presence of Hessian Fly began to come in at the end of August, and through the courtesy of Mr. Geo. Batho, of the *Nor-west Farmer,* Winnipeg, I have been allowed to consult the correspondence which was sent in to his paper on the subject. The district over which the Hessian Fly injured wheat crops to some extent, was the whole south of the province, west of the Red River, and a short way into the North-west Territories. Mr. Batho, writing on October 9, says:—

'There was some loss due to the Hessian Fly over a large area in the southern part of the province; some fields about Morden, Roland and Carman were badly struck; but the attack was not general in all fields in any other part of the country. From most of our reports it would appear that the heavy crops escaped, but the light ones were always likely to be attacked. It seems to me that this can be explained by the heavy crops occurring on land which had been summer-fallowed, and where consequently no flies had wintered over, while the light crops were on stubble land that had been cropped last year and which might have been affected to some extent, although the injury was not noticed.'

'Nov. 22.—I have found out since I last wrote, that the loss from the Hessian Fly is probably greater than one might suppose from any reports that have been published. A farmer at Griswold told me the other day that there was considerable loss in that district. At Portage la Prairie there was heavy loss, and one farmer stated his belief that there was a small amount of loss every year and had been for several seasons past.'—Geo. Batho.

There is little doubt that loss from the Hessian Fly was larger than was generally recognized; but, owing to the heavy crop of wheat all through the country, little attention was paid to this matter. Unfortunately, many of the farmers of the West take the mistaken view of the subject that is expressed in a letter upon this outbreak, published in the *Nor-west Farmer* of September 5 last, where the writer says: 'I think the estimate of 5 per cent not too high for the loss. Where I am cutting, I expect 35 or 40 bushels per acre, so I do not kick about a little loss.' The writer evidently does not appreciate that the little loss of this year may multiply, under favourable circumstances, into an enormous one next year. The article referred to in the *Nor-west Farmer* was very timely, and stated the facts of the case plainly and well, giving the life history of the insect, the best remedies, and concluding with the following wise statement:—

'The principal reason why care should be taken to destroy the pupæ of the Hessian Fly this fall, is of course to prevent the possibility of a much more serious attack next year.'

The following extracts from correspondence show how widespread the attack was in Manitoba, and the probable loss:—

'Aug. 28, Virden, Man.—Crops are apparently good; but, when the binder goes into the field, they do not show up so well. We are able, by lowering the binder, to pick up most of the grain; but the sample is not as good as the rest of the field.'—A. P. Power.

'Aug. 29, Pilot Mound, Man.—It seems to be all through the crop of wheat this year.'—J. S. Moffatt.

'Sept. 2, Wellwyn, Sask.—The insects are located between the sheath and the straw itself. The damage will amount to from two to three bushels to the acre, as it is impossible to pick up all heads with the binder.'—F. J. Collyer.

'Sept. 7, Reston, Man.—I first noticed the Hessian Fly at Roland. Most farmers showed no interest in the matter, saying that the trouble occurred to the same extent every year. One old Ontario farmer, however, who knew the Hessian Fly, deplored its appearance, remembering the harm that it had done in Ontario. At Miami I found a few flax seeds in a late crop and a few at Belmont and Reston. The field at Roland would average 5 per cent injury all over; but in some patches it would be more than double that.'—John McBean.

'Sept. 7, Portage la Prairie, Man.—I noticed damage from Hessian Fly seemed to be much worse after two days of heavy wind towards the last of cutting. Crops on some of the older land were injured to the extent of 5 per cent or more These summer-fallows on new land did not seem to be so bad.'—D. W. McKirdy.

'Oct. 31, Cartwright, Man.—We have a little Hessian Fly here, but some miles away further south it was very bad. I put a letter in the local paper, advising farmers to burn straw even more liberally than they have been in the habit of doing.'—E. F. Heath.

'Sept. 7, Wellwyn, Sask.—Hessian Fly has done great harm to the wheat crop here this year.'—John Hislop.

There seems to have been no uniformity of opinion as to the crop conditions which attracted the females when they were laying eggs, some farmers stating that the heavy crops on summer-fallowed land were worst attacked, while others claimed that exactly the opposite was the case. The following letter from Mr. L. E. Marmont, who has made a study of insects and their habits is of interest:—

'Nov. 28, Rounthwaite, Man.—I regret to say that the damage in this neighbourhood from Hessian Fly during the past summer was the worst since 1902. On summer-fallows, where the wheat was heaviest, there were so many broken down straws that it interfered with the proper working of the binder. Cutting had to be done so low down to get the bent over stuff, that it resulted in long ragged sheaves and an amount of straw which made an appreciable difference in the time taken in threshing. I examined straws in many fields and found from three to five flax-seeds at a joint. Many of these, I found, were very light and apparently dead. We had some extremely warm days during harvest, and this may have affected some of them. The wheat itself in injured stems was almost as plump as the unaffected; so, we cut as low as possible so as to get it. I have urged all my neighbours to try and burn their stubble, if possible; but the fall has not been very favourable in this way, still a good deal has been burned over, and, if the spring is dry, more will be done then. Threshing was so slow and the ground was frozen up so early that the area of fall ploughing is the smallest ever known; consequently, little has been done in this way against the fly, and I fear we shall have a repetition of the spring damage to the young wheat, such as we had in the spring of 1903, unless the stubble is burnt over or turned down early. I think that from three to five bushels per acre would be a conservative estimate of the damage round here.'

'Dec. 8.—My son and I think that in Blyth and the surrounding district, the damage to wheat from the Hessian Fly would be about five per cent. The early sown grain would be less and the late a little more.'—G. S. Charleson.

The Location of the Injury.—The larvæ of the Hessian Fly attack the stems of wheat, barley and rye, either in the root shoots of fall-sown grain, in autumn as well as in spring, before the stems are formed or of spring grain in the root shoots or at the second joint above the root. The minute red eggs are laid on the leaves by very small gnats half the size of an ordinary mosquito, during June or soon after the young plants appear above the ground. The appearance of the flies and the hatching of the eggs are, however, very much influenced by weather conditions. Both of these may be accelerated by warm damp weather, or the emergence may be delayed by dry cold weather. After emerging, the mature flies pair at once, lay their eggs, and in a very few days disappear. It is claimed that the Hessian Fly does not travel very far from the field where it develops from the puparia or flax-seeds. This is an important point, indicating the necessity of treating fields which are known to have been infested to a certain extent. As soon as the little maggots hatch from the eggs, they work their way down to the base of the leaf sheaths and attack the young stem at its junction with the leaf. Frequently the stem is prevented from forming and the shoot is destroyed; but a very few days' delay in the time of the laying of the eggs or of the hatching of the larvæ, enables the stem to begin to shoot up; and, when this takes place, they nearly always develop and form an ear. In this latter case, the injury is of course much less than when the shoot is destroyed. The larvæ lie at the base of the leaf and attack the succulent tender straw just above the joint, sucking the sap and gradually forming a more or less noticeable depression in the soft stem inside which they lie. When only one or two maggots occur on a straw the injury is not very severe and attacked stems when not knocked down by high wind at harvest time may produce fairly heavy grain. Sometimes, however, the maggots suck the sap to such an extent that the stem is killed at the point of injury and the tissues separate, when the stem falls over, displacing the flax-seeds and making them appear as if they had formed inside the stem. This was the case last season in Manitoba and caused uncertainty on the part of some observant farmers as to the identity of the insect which had done the injury. I am obliged to my correspondent, Mr. Sanford Manson, for calling my attention to this matter; for it should certainly be mentioned when describing the nature of the attack of the Hessian Fly. He writes:—

'Nov. 23, Sperling, Man.—I send a few wheat stems that have suffered from insect attack this summer. I have just received a very welcome bulletin (No. 52) which treats of insects; but I cannot find anything which resembles it nearer than the Hessian Fly; only the description of that insect states that it is found on the outside of the stem beneath the sheath of the leaf. You will notice that this pupa is inside the stem. I spoke to a number of farmers about the matter, and they all agreed that the pupa was inside the stem. It did not seem to affect the wheat very much, as the broken down heads were as well filled as the standing ones; but in some fields the loss from breaking down so low was that the binders could not pick it up. This made considerable loss, variously estimated at from two to five bushels per acre. It seems to have been general in this district. About the last of September it was found that the pupa had developed and the grub had eaten its way out. Therefore, it is only the deserted shell, which I am sending you. Both early and late sown wheat suffered.'

The material sent showed that some of the flax-seeds were as stated inside the straw; but in these cases the injured straw was blackened from decay, and shreaded and broken up by the twisting of the straw at the time it bent and fell over. By softening the stems in water and examining them carefully, the cavity in which the larvæ had lain while active could always be traced; and, although this depression was deeply dented into the stem, it was actually on the outside of it, beneath the base of the leaf sheath. Mr. Manson and some other correspondents have referred to empty flax-seeds being found on the stems in autumn. This is an important matter as it indicates the probability that parasites or other natural enemies have been at work, and it is therefore a very hopeful sign for the future.

There are several parasites which prey upon the Hessian Fly, and their good offices in the past have been the chief cause of the sudden disappearance from infested districts of this serious enemy of the farmer. When emerging naturally, the pupa of the Hessian Fly works its way out of the brown flax-seed-like puparium and the gauzy, empty, pupa-case is left, protruding conspicuously from the end. A parasite on leaving the puparium gnaws a ragged hole which may be in any part of the puparium. In Manitoba there is only one brood of the Hessian Fly. The puparia are found in the late summer. By harvest time all the larvæ have turned to the flax-seed stage, and the flies do not emerge until the following June. A knowledge of the habits of the insect in Manitoba suggests the best remedial measures. The puparia of all the maggots which attack the root shoots in early summer, and most of those on the straw are left in the stubble fields after the wheat is cut. An effective way of disposing of these is, when it is conveniently possible, to burn over the stubbles before the following year and to plough down the land deeply before the next crop is sown. The burning will destroy a great many of the insects, and the ploughing will put them so deep down that the delicate flies, when they emerge, cannot reach the surface. In years of bad infestation a great effort should be made to get as much fall ploughing done as possible, so as to reduce the danger of infested stubble fields being left for summer-fallowing, owing to the pressure of spring work. As it is necessary to cut low to pick up fallen grain, many of the flax-seeds will be carried with the straw. At threshing time most of these will fall with the rubbish beneath the machine, or will be left in the straw. All dust and screenings, therefore, should be destroyed, and all straw and small seeds should either be used up during the winter or burnt before spring. In Ontario and the eastern provinces there are two annual broods of the Hessian Fly. The flies of the first brood appear in June and lay their eggs on spring and fall wheat and on rye and barley. Of the second brood the flies appear in September and lay their eggs on fall wheat and fall rye. Wheat, barley and rye are the only known food plants of the Hessian Fly in America, and neither oats nor the grasses are attacked.

The remedies which have given the best results against the autumn brood are late sowing and careful preparation of the land, so as to induce a vigorous growth.

The Western Wheat-stem Sawfly (*Cephus occidentalis,* Riley & Marlatt).—For several years the larva of a wheat-stem sawfly has done some injury to growing wheat at different places in Manitoba and the North-west Territories. It was at first supposed, from the similarity of the attack and from a few reared specimens, that the insect was the European species, *Cephus pygmæus,* L., which had appeared suddenly in injurious numbers at Ithaca, N.Y., in 1889. This attack was treated of at length by Prof. Comstock in Cornell Agricultural College Bulletin No. 11, 1889. The following year the insect disappeared entirely, and nothing has been seen of its work from that time. In previous reports I have referred to this western sawfly as *C. pygmæus,* but recently specimens of our North-western insect have been submitted to Prof. A. D. MacGillivray, of Cornell University, who has identified them as *Cephus occidentalis,* Riley and Marlatt. The insect has been studied by Mr. Norman Criddle, of Aweme, Man., and he has added very materially to our knowledge of the species and its work. He has discovered its native food plants and also that these are far more attractive to it than the wheat plant, which it occasionally infests.

'July 10, Aweme, Man.—I collected several specimens of the Cephus yesterday. They were all resting on *Agropyrum caninum.* So far, I have been unable to find them elsewhere; and, though they are always found rather plentifully around the edges of wheat or indeed anywhere, infesting the above grass, I have very seldom been able to find wheat plants attacked by them. I have not yet been able to get hold of the species which breeds in *Ammophila longifolia;* but I am confident that it will prove to be a distinct species, as the larva is very different, being quite yellow in colour, while that of the Agropyrum species, *C. occidentalis,* is white.'

'July 30.—I found to-day two stalks of wheat infested by Cephus and several stems of *Agropyrum* were found also attacked within a few feet of them. I afterwards hunted over a large area of wheat, but was unable to find another wheat plant which was infested, though any amount of *Agropyrum caninum* was found which had been attacked. In several cases the grass was in the wheat fields. I think, therefore, that the wheat being attacked must be considered an accidental occurrence. At the same time, if the grass failed for any reason to form heads, these insects might possibly develop into a pest of some magnitude.'

'Aug. 4.—Two more stalks of wheat have been found attacked by the Agropyrum Cephus in a place where that plant was rare. I also found it quite numerously yesterday infesting our native quack grass, *Agropyrum glaucum,* R. & S., var. *occidentale,* V. & S.'

'Aug. 6.—Cephus occidentalis has now been found here, feeding in the following grasses: *Agropyrum caninum, A. glaucum,* var. *occidentale,* and *A. tenerum,* and also in rye and wheat, the first named and possibly the second being the native food plants, the others being only occasionally attacked.'—Norman Criddle.

From the above it is evident that several native grasses are more attractive to the Western Wheat-stem Sawfly than is wheat. Some of the above species of grasses are common in almost all parts of the West, and their occurrence may be hoped to protect wheat from serious attack under ordinary circumstances. Should the larvæ, however, at any time occur in noticeable numbers in a growing crop of wheat, it may be remembered that they pass the winter on the fields in the bases of straws, which they have cut off before spinning the silken cocoons in which they winter over, close to the surface of the ground. The stubbles in fields which have been infested, should, therefore, be burnt over in autumn or spring, or should be ploughed down deeply before the middle of June, so as to make it impossible for the flies to work their way up to the surface. Stubble fields left for summer-fallowing should be turned down early in June; and, should the insect at any time become more destructive than it has in the past, early summer-fallowing should be practised every other year.

THE JOINT WORM (*Isosoma tritici,* Fitch).—Injuries to grain crops in Canada by Joint Worms are seldom complained of; but during the past summer there have been a few outbreaks which have been serious, although restricted as to area. These were in western Ontario and in Prince Edward Island. Mr. T. D. Jarvis, of the Agricultural College, at Guelph, reports that the Joint Worm was abundant and destructive at Guelph. Mr. D. C. Dewhurst also reported it from Cottam in Essex county, and Mr. R. J. Doake from Millbrook, Durham county. Notwithstanding these local occurrences there were few references to Joint Worms in correspondence. In Prince Edward Island the loss from Joint Worms seems to have been more severe. Through the kindness of the Rev. Father Burke I learnt of the occurrence and obtained particulars. The Joint Worm was frequently found in the same fields with the Hessian Fly and the Wheat Midge. The two last, however, were in much smaller numbers than the first.

'Aug. 22, Bayview, P.E.I.—Find inclosed sections of wheat straw with diseased joints. There is considerable damage to wheat in this locality. The disease is always in the top joint. If this increases here, I fear very much for our wheat crop another year.'—WALTER SIMPSON.

'Sep. 17, Darnley, P.E.I.—Herewith I send samples of injured wheat straw. What is the cause of the swollen and bent stem? Many fields are affected with these distorted joints and short straw. Some fields are half gone.'—WILLIAM BASSETT.

'Aug. 22, Park Corners, P.E.I.—I send sample of my wheat. The whole crop was destroyed by some kind of vermin which has also destroyed all wheat about here.'—ALEX. CAMPBELL.

'Nov. 17, Kensington, P.E.I.—I learn by inquiry that the Joint Worm has been troublesome in lots 18 and 19 in Prince county, and on lot 20 in Queen's. There are also a few other places. Where the crop was light, the damage was almost complete. In strong growing grain there was only slight loss.'—JOHN ANDERSON.

'Aug. 14, Malpeque, P.E.I.—I send you samples of wheat which have been affected while growing, by two different enemies. You will notice that some stalks have a swollen joint just below the head, which has turned it at about a right angle to the stalk. I have opened some of these and find small maggots. Another trouble seems to be that the stalk is eaten almost off very near to the base, so that it dies. These two troubles are causing great damage in this vicinity. Some of our wheat fields in this vicinity, especially in Long River and French River, are much injured, so that some farmers are cutting down their grain for feed.'—REV. E. J. RATTEE.

Upon examining these samples, it was found that they were badly attacked by the Joint Worm and also by the Hessian Fly. There were also a few specimens of the red larvæ of the Wheat Midge clustered round the kernels of the wheat in the ear.

Mr. Rattee was informed what the insects were, and it was suggested that the stubble should be ploughed down deeply directly the crop was cut. In his reply, he points out that there would be difficulty in getting farmers to do this because of the prevailing practice of seeding down with a wheat crop, for hay the following year. This, of course, would be a difficulty everywhere; but, as the Joint Worm distorts the stems so that a large number of the hardened joints occur so close to the ground that they are left on the fields with the stubble, it will be found a paying practice even to plough down these new meadows after a single year's growth, rather than to leave them for hay while there is any risk of allowing the Joint Worm to increase. Moreover, if a few pounds of clover seed are mixed with the grass seed at the time of sowing, the growth of clover will much more than pay for the seed used by the extra fertility thus added to the soil. Mr. Rattee states that the areas specially infested in his district were the western portion of Queen's county and the eastern part of Prince county.

The standard remedies for Joint Worms are deep ploughing or the burning over of stubble before the insects emerge in spring, the destruction of straw and screenings, and a short rotation of crops, with high farming to keep up the fertility of the soil. Prof. F. M. Webster, who has made a special study of the insect enemies of small grains, writes on this subject in Circular No. 66, U. S. Bureau of Entomology, as follows: 'There are no known remedies for Joint Worms; but there are several preventive measures that are not impracticable and are reasonably efficient. The Joint Worm Convention which was held many years ago at Warrenton in Virginia, recommended officially that a better system of farming be adopted, with the use of guano and other fertilizers, to promote a rapid growth and early ripening of the grain, and also the burning of stubble, all of which are as advisable to-day as they were at that time. The most serious ravages are observed on thin or impoverished soils, especially along the margins of the fields infested. Anything, then, that tends to add vigour to the young growing grain, will constitute a preventive measure. Burning the stubble where this is practicable, is, of course, most efficacious; but, over the larger portion of the territory ravaged by this pest, it is customary to seed for grass after wheat, and under this condition burning over the stubble fields is impossible. Such fields should be raked over with an ordinary hay rake and the loosened stubble removed and burned before the adults emerge in spring.'

If the straw can be cut low enough to carry the larva-bearing joints from the field with the crop, the using up of this straw before spring would dispose of the insects in a satisfactory manner. It must not be forgotten that at threshing time many of the broken off hardened pieces of straw become separated and are carried through with the grain or with the rubbish. These, therefore, must be attended to in some way which will destroy the larvæ or prevent them from hatching in the spring. All screenings are far better for feed when crushed, and the larvæ in the refuse might be destroyed by placing this in a cattle yard, where it would be trodden into the sodden earth, or into a fresh manure pile, where the insects would be destroyed by the heat of fermentation or by being saturated with the ammoniacal liquids.

THE WHEAT MIDGE (*Diplosis tritici*, Kirby).—In my last year's report I referred to an outbreak of this old enemy of the wheat grower, in the Chilliwack valley of British Columbia. As it was thought possible that the injury might recur this year, a full account of the life history was then given, with a list of the best remedies. During the past summer the Wheat Midge again appeared and was the cause of much loss. Mr. Thomas A. Sharpe, the Superintendent of the Experimental Farm for British Columbia, reports as follows:—

'Agassiz, July 19.—Our spring wheat is badly infested with weevil (= Wheat Midge). Last year it took a large share of Chilliwack spring wheat and some late patches on this side. This year it is taking every one's crop so far as I can hear.'

In 1904 the British Columbia outbreak was the only one reported; but during the season of 1905 I have received reports that the Wheat Midge has been detected at one or two localities in Ontario and in Prince Edward Island. Undoubted specimens were received from the Rev. E. J. Rattee, of Malpeque, P.E.I., and Dr. Charles E. Saunders handed me a specimen found at Ottawa in wheat grown on the Experimental Farm. He further tells me that he found a few of the larvæ last year, when examining hybrid wheats produced in the experimental plots. He also gave me grains of wheat showing the characteristic injury of this insect. In the Ontario Crop Report for August last it is stated that, although all correspondents are silent as to the presence of Hessian Fly, three or four mention injury from either Midge or Joint Worm.

As this minute insect is capable of causing enormous losses in the wheat crop, should it increase in numbers, it seems well to repeat the remedies which have given the best results.

Remedies.—The remedies for the Wheat Midge depend largely upon the way it passes the winter. The methods which have given the best results are as follows:—

(1) Deep ploughing directly the crop is carried, so as to bury the larvæ so deep that the flies cannot work their way out through the soil.

(2) The burning of all chaff, dust or rubbish known as 'screenings' or 'tailings' from beneath the threshing machines, as these contain many of the larvæ which are carried with the crop. If fed to chickens or domestic animals, this should be done in a place where none of the puparia can escape destruction.

(3) Clean farming, including the cutting of all grasses along the edges of fields and the ploughing down of all volunteer crops found in wheat fields before winter sets in, so as to destroy an autumn brood where one exists.

(4) The cultivation of such varieties of wheat as experience has shown are least affected by this insect.

CUTWORMS IN GRAIN.—There have been rather extensive injuries by cutworms in grain fields in some parts of Manitoba and the North-west Territories during 1905. The worst of these were in the Edmonton district and other points in Northern Alberta, and in Northern Manitoba. Very few specimens were sent with these complaints of injury, farmers for the most part failing to see the importance of forwarding samples of what they consider such a well known pest. This, however, is far from being the case, and it would help most materially in many instances toward getting prompt and useful advice if specimens were sent. There are a great many kinds of cutworms, all of which vary somewhat in their habits. The points of value to a specialist when advising farmers how to avoid loss, are the exact identity of the species at work, because the habits, the ordinary food plant, usual time of attaining full growth, when power to do injury to crop ceases, and many other points which bear on the choice of the most practical remedy to be recommended, are already known for many species of cutworms. A glance at specimens of the insects is of far more use than the longest descriptions of the cutworms by those who are not used to describing insects. From such specimens as were sent, it is evident that the greater part of the loss in many different kinds of crops was due to the Red-backed Cutworm (*Paragrotis ochrogaster,* Gn.). This is a very wide-spread species, occurring from Nova Scotia to British Columbia. The caterpillar, when full grown, is nearly two inches long; it is very voracious, and will attack almost all succulent vegetation. It is the species which has been the cause of by far the greater part of the loss in grain fields of the West during recent years.

The following letters, chosen from many received, indicate the nature of the infestation:—

'June 10, Regina.—Cutworms, mostly *P. ochrogaster,* are making havoc in wheat and oat crops up the Edmonton line.'—T. N. WILLING.

'June 12, Edmonton.—I send specimens of worms that have been destroying the grain about a month. They seem to be most destructive on summer-fallow, although they are now working on spring ploughing and new breaking. They have completely destroyed about ten acres of oats and barley for me, and partly destroyed some wheat. They have destroyed grain over a large part of this country, some having lost from one-third to one-half of their crop. They are now crawling over the ground by the thousand and are working on grain that is ten inches high.'—JOHN N. KERR.

'June 12, Winnipeg, Man.—I have just returned from a week's farmers' institute work in the Swan River and Dauphin districts in Northern Manitoba. At Dauphin a number of the farmers were complaining that considerable damage had been done to the crops by cutworms. One farmer, Alex. Birrs, of Dauphin, had had about ten acres of his oat field entirely cleaned out by this pest.'—GEO. BATHO.

'June 20, Dauphin, Man.—I have sent by this mail a pill-box containing about ten cutworms gathered from my barley field, together with a few of the stems cut off by them, including a sunflower stem, which was not cut through entirely, but so nearly so that the plant had fallen to the ground. When I last wrote, the cutworms were working in my neighbour's wheat; but on Friday last they appeared in my barley, although half a mile intervenes, which is sown to wheat. These pests are very prevalent in the Dauphin district. I had an idea that their spreading arose from allowing fallows to grow up in weeds. Their appearance in my barley confirms this idea, as my barley field was not ploughed until spring. A part which was fall-ploughed is free of cutworms. I will be glad of your opinion of this matter.'—THOMAS C. ROBSON.

'November 21, Winnipeg, Man.—Cutworms have been noticeable in some districts during the past season. Reports in a few cases indicated that crops of oats and wheat had to be ploughed up; but the extent of the damage from this pest could not be considered in general to be alarming. It is sufficient, however, to show that in future this insect will have to be considered by the agriculturists of Manitoba, and perhaps, in some districts, a system of cultivation, adopted that will tend to retard its reproduction.'—W. J. BLACK.

The poisoned bran remedy for cutworms is so remarkably effective that I cannot understand how it is farmers who suffer year after year from these enemies, do not remember about it and save their crops. On the whole, I know of no remedy for any injurious insect which has given better results. I can only suppose that the reason why it is not more used, is that, owing to the large size of grain fields, added to the fact that the cutworms do their injury at night, farmers do not at first notice them and then give up in despair, thinking that nothing can be done. A noticeable feature in nearly all the letters received was that these outbreaks occurred on land where vegetation had been left standing the autumn before, either in stubble fields or upon so-called summer-fallows which had been allowed to grow up to weeds late in autumn, because it was thought that, as the weeds could not ripen seeds after the last harrowing, they could do no harm. The presence of vegetation on land in autumn, however, attracts the female moths which lay the eggs from which cutworms are produced. Therefore, all summer-fallows should be kept thoroughly clean right up to cold weather in autumn. Another noticeable fact with regard to the habits of the Red-backed Cutworm is its tendency, when occurring in large numbers, to take the habit of the true Army Worm and march from field to field in search of food. This enables farmers who are alert to head off their advance by placing poisoned bait in their way, which they will eat as soon as they reach it and will be killed in large numbers. If bran cannot be conveniently obtained, any kind of coarse vegetation may be used,—lamb's-quarters, grass, or weeds tied in loose bundles—taking as much as can be grasped in the hand at one time for each bundle, and then dipping these into water containing about an ounce of Paris green to 5 gallons of water. These bundles should be placed about six or eight feet apart, in advance of the army of caterpillars. If bran can be obtained, the mixture should be made dry enough to be broadcasted lightly through the grain or in such places where the cutworms are most abundant. The food habits of the Red-backed Cutworm are remarkable and differ in this respect from almost any other insect known to me. Sometimes a horde of these caterpillars will attack by preference some particular kind of plant and leave other things untouched. They have been found to occur in weedy wheat fields and confine their attention entirely to the lamb's-quarters and other weeds. In other places they will attack oats and leave everything else untouched, and, even when an oat field joins a wheat field, they will stop when they reach the wheat and wander on long distances in search of other food. At other places it will be the wheat that is destroyed and oats will escape. From the above, it is plain that some little observation and thought will be of advantage when an attack is noticed. and it may even be found wise on special occasions to leave a horde of cutworms alone all the time they are confining themselves to weeds, but to watch them carefully and have everything ready to apply the poisoned baits, should they change their taste and turn to the farmer's crops. What I wish to point out to farmers now, is that in outbreaks of cutworms, both in gardens and also in field crops, the poisoned bran is a practical remedy which they will do well to try, over a small space, at any rate, whether they believe in its efficacy or not. I have occasionally met people at farmers' institute meetings who jeered at this remedy and declared that it was of no use. In every instance, however, I have found, upon pressing the matter, that it had never been tried by those who condemned it. In field practice, then, it is plain we have two good remedies for cutworms, first the keeping down of all weeds in the autumn, so that the egg laying female moths may not be attracted to the fields, and the poisoned bran or poisoned bait in spring, when the cutworms are found at work.

GRASSHOPPERS OR LOCUSTS.—The same satisfactory report which was made last year with regard to the injurious occurrence of locusts in Manitoba can be repeated for 1905. The only injuries by these insects which were brought to my notice in 1905, were in Manitoba, and were of a trifling nature. This was probably largely due to the nature of the season in those districts, where in the past they have done so much harm. Mr. W. J. Black, the Deputy Minister of Agriculture for Manitoba, writing on this subject, says: 'That celebrated Manitoba intruder, the grasshopper, was not in evidence during the past year to the same extent as previously. A few farmers in the municipality of South Cypress found it necessary to use Paris green to destroy the insects during the early summer; but, owing no doubt to an abundant rainfall in the season when crops were growing, no serious damage has resulted.

Mr. Norman Criddle, of Aweme, Man., says:—'Locusts are no longer troublesome here. In the Stockton district a strip of wheat on light soil was noticed which had been eaten into for about fifteen feet. This was the only place that I have heard of where any damage was done, and, so far as I could see, no effort had been made to stop their depredations.

THE PEA MOTH (*Semasia nigricana,* Steph.).—The caterpillars of the Pea Moth were abundant in Nova Scotia and New Brunswick, and also in some parts of Quebec province and in northern Ontario. In the past there is no doubt that injury by this insect has been confused with that of the Pea Weevil. This is largely due to the foolish and widespread use of the word 'bug,' for every kind of insect; but in this case I find that it has been the cause of the useless expense and trouble in treating a large number of seed peas for an insect which was nowhere near the seed but was passing the winter safely in the fields where it had destroyed a crop the previous year. The Pea Moth has come much more into prominence during the past two seasons, owing to the almost total absence from our Canadian pea fields of the Pea Weevil (*Bruchus pisorum,* L.). The presence of the Pea Moth in Canada as an enemy of cultivated crops may be said to be a regular occurrence in all the eastern provinces, from the Atlantic seaboard as far as the eastern counties of Ontario. In the province of Ontario, although sometimes widespread and serious outbreaks occur, they are of a very intermittent nature and for many years no injury can be detected in cultivated peas. There is, however, in wild leguminous plants a native insect with a very similar caterpillar, which is widely distributed through most parts of Canada. Although the work of this insect has been detected many times, up to the present the moths have not been reared.

Owing to the importance of the injury by the Pea Moth, I have, when occasion arose, tried experiments to see whether spraying the peas immediately after the pods were formed with a poisoned soap mixture might not be effective in the same way that a similar treatment is for the Codling Moth. The insect occurs so seldom at Ottawa that it is difficult to arrange experiments. Some years ago Mr. J. E. Wetmore, of Clifton, N.B., kindly carried out for me some experiments which seemed to indicate that this might be a useful remedy; but I regret to say that some careful investigations recently made by Mr. Saxby Blair, at the Experimental Farm at Nappan, Nova Scotia, have not confirmed these good results. The exact history of our American Pea Moth has never yet been traced; but it is to be presumed that the eggs are laid on the young pods as soon as these are formed, and that the caterpillars eat their way into them and attack the forming seeds. It was hoped that, by distributing a thin film of poison over the plants and pods, the young caterpillars would be poisoned when eating their way in. On account of the waxy covering on the surface of all parts of the pea plant, whale oil soap was added to the poison mixture to make it adhere. For early peas the application was Paris green ¼ lb., whale-oil soap 1 lb., water 40 gallons. The plots were sprayed just after the pods were formed, and one application only was made. The early varieties of peas used were the Alaska, Gradus and American Wonder. The pods were gathered about 10 days after the spraying, and, when the treated and untreated lots of 500 pods each were examined, it was found that there was practically no difference in the amount of infestation, which ranged from 3 to 11 per cent. For late peas, the amount of Paris green was doubled for a second application, that is, these peas received two sprayings, the first on July 20, with the ¼ lb. mixture of Paris green, and the second on July 29, with half a pound. The pods were not gathered until August 17, and the results were no better than in the other experiments. Where the poison was used, 22 per cent of the pods were wormy; and where none was used, there were a few more, i.e., 27 per cent. It is possible that a knowledge of the full life history of this insect may give a suggestion as to a practical remedy, and efforts will be made to obtain these data as soon as possible.

The remedies which have given the best results, are the planting of peas as early as possible and sowing the earliest ripening varieties. For table use any variety which can be grown ready for the table by the first week in July, will be free from attack. As this insect passes the winter as a caterpillar inside a silken cocoon spun in the ground beneath the plant upon the seeds of which it had fed, it is of course advisable to adopt the common sense practise to use land for the new crop as far as possible removed from fields which have been used previously for the cultivation of seed pease. As soon as the crop is picked, all pea vines should at once be burnt so as to destroy small and imperfect pods which frequently contain the larvæ of the moth.

The perfect insect which lays the eggs from which the 'pea worms' hatch is a small gray moth three-eighths of an inch in length when the wings are closed, which is able to fly a considerable distance. A correspondent was good enough to give me the following information which may be of use in working out the complete life history of this insect. Mr. W. E. Taylor, writing from Beaverton, Ont., on Nov. 25, says:

'I wish to ask you about the statement in Bulletin 52, where you recommend to sow pease as far as possible from the previous year's pea field. I sowed my pease this year more than a mile from any other pea field and pease have not been grown near here for three years. The crop was wormy. We have no 'Bug' or true Pea Weevil here, so they were the caterpillars of the Pea moth. The seed was sown about May 20, and it was an early kind, the June or Dan O'Rourke. How did the pest get here? Do the moths lay eggs on the dry pease and gum them over?'

In the above instance the moths must have flown from a distance to lay their eggs. These, as stated above, are laid outside the pea pods, while these latter are green and soft.

FODDER CROPS.

Fodder crops were, on the whole, very satisfactory. Large crops of hay were secured in the west, and the prairies provided good pasture all through the summer. Brome grass and Western Rye grass are being more grown every year. 'Pastures (in

Ontario) were in from fair to good condition during the summer and fall, and this favoured all classes of live stock. Cold, wet weather at time of planting gave corn a set back; but midsummer conditions were so favourable that corn picked up in a wonderful way. Most returns show an average yield.'—C. C. JAMES, *Nov. Crop Bull.*

The same conditions and results as prevailed in Ontario, were also found in Quebec and parts of New Brunswick. For the last named province, generally speaking, the crop of hay was good; some counties cut more than ever before, but a cold, wet spring followed by a long drought was severely felt in some places. The returns from Nova Scotia in all but two or three counties show fodder crops were well above the average. 'We have had a better season for the growth of crops than for several years, that is, if we except apples.' (B. W. Chipman.) In Prince Edward Island 'Hay crops were almost up to the average. Clover and timothy were somewhat light owing to the drought of last year. Hay was saved in good condition. In very few places is corn reported below the average.' (J. C. Readey.) There was no serious loss in fodder crops from insects. Cutworms, as is the case every year, were troublesome in some places early in the season, but the season allowed of gaps being filled by resowing. Near Montreal the Corn Root Maggot was reported in corn fields where germination of the seed had been delayed by cool, dry weather. Clover, although very much attacked by the Clover-seed Midge in Ontario, gave very heavy crops of hay in all the eastern provinces of the Dominion. The Clover Leaf Weevil and the Green Clover Weevil were reported from the Ottawa district, the former for the first time, and the Red-headed Flea-beetle (*Systena frontalis,* Fab.) from Ottawa and Guelph; but no appreciable injury was wrought. Clover Dodder was frequently inquired about from the abundance of the seed in clover seed sold. In one instance a crop of alfalfa at St. Mary's, Ont., was much injured.

THE ROSE CHAFER (*Macrodactylus subspinosus,* Fab.).—This well known enemy of the fruit grower and flower gardener has this year appeared in a new role. Towards the end of June last the Steele, Briggs Seed Co., of Toronto, sent me several specimens of the Rose Chafer beetles, with the surprising statment that they had been taken from a 20-acre field of fodder corn, growing near Priceville, Ont., which they had been attacking for two days. The corn at the time was about eight inches high, and growing very thriftily. There was no appearance whatever of any trouble four days before the letter was written; but the beetles appeared in vast numbers on June 26, and covered about two-thirds of the field, averaging about twenty insects to a plant, and began to devour the leaves. Naturally a remedy was asked for as soon as possible, as it was claimed that no one there knew the insect or had ever seen anything like it before on corn. It was suggested to the owners, Messrs. S. Price & Sons, of Toronto, to spray the fields at once with a whale-oil soap solution of one pound of soap in five gallons of water, this application having been found very effective against the Rose Chafer by Prof. Webster, in Indiana, the spray killing every beetle it fell upon. It was also suggested to dust the crop with a mixture of one pound of Paris green in 20 pounds of freshly slaked lime. Fortunately, the visitation was of very short duration, and the crop subsequently outgrew all traces of the injury. Messrs. Price & Sons wrote with regard to this outbreak on July 19, as follows: 'We are glad to say that the Rose Chafers which were injuring our corn field a few weeks ago, have all gone. They all went inside of 24 hours after we had written to you. They stayed with us for three days and did considerable injury; but the corn now seems to have outgrown it, and to be all right. They all flew away before we had a chance to spray them.'

ROOTS AND VEGETABLES.

Root crops in most parts of the Dominion gave heavy returns. Potatoes in Ontario and in parts of Manitoba were materially reduced by the Potato Rot. Turnips were, generally speaking, poor and far less satisfactory than mangels. The Turnip Aphis was reported as in greater numbers in western Ontario than for many years. In the eastern counties of the province the reverse of this was the case. Cutworms did some harm and the Turnip Flea-beetle was stated to be very destructive in Pictou county, N.S. The Colorado Potato Beetle was less destructive than usual in the Maritime Provinces, but was mentioned as unusually abundant in Manitoba. Mr. W. J. Black, of Winnipeg, writes:—'The Potato Beetle has this year been much more in evidence than ever before; and, in many cases, those who have not been previously familiar with this insect and its method of destroying the potato plant, have had their crops literally consumed before they were aware of what was taking place. The greatest damage from this pest has been in the Red River valley; but it would appear that it is gradually working its way westward. It was noticeable as far west as Portage la Prairie; but at Brandon it has not yet become destructive. Cutworms, chiefly the Red-backed Cutworm, did much injury at several places, in gardens as well as in fields. Where attended to promptly with the poisoned bran remedy satisfactory results were invariably secured. Two new pests of cultivated plants were reported from Manitoba by Mr. Norman Criddle. The Knot-weed Beetle (*Gastroidea polygoni,* L.) did considerable harm to rhubarb by eating holes in the leaves, and *Galeruca externa*, Say, a chrysomelid which feeds naturally on *Lepidium apetalum,* an indigenous member of the cress family, turned its attention to cabbages and turnips.

THE STALK BORER (*Papaipema nitela,* Gn.).—In the past all references to injury by stalk borers in potatoes, corn and other crops in Canada have been for the most part attributed to the caterpillars of the Stalk Borer (*Papaipema nitelæ,* Gn.), sometimes referred to as the Potato Stalk Borer. At Ottawa many years ago I found that nearly all injuries by stalk borers to plants in vegetable and flower gardens were by the Burdock Borer (*Papaipema cataphracta,* Grt), and I could find no specimens of *P. nitela* in collections, which had been reared from cultivated plants in Canada. During the past summer, however, *P. nitela* was very abundant and destructive in the western counties of Ontario and in the State of Michigan. Through the kindness of Professor Lochhead, I learnt of localities where I could obtain specimens for study. Mr. G. W. Riseborough, of Fargo, Ont., helped me very much in this investigation and kindly sent me several consignments of the caterpillars and the plants they were attacking, as well as some parasites which he had found with the larvæ. Although, on the whole, this abundant occurrence of the Stalk Borer in Ontario had little effect on the crops attacked, it was very interesting and worthy of record.

'Fargo, Ont., July 3.—I was examining to-day some of my corn fields and find that the borer has left them very thin in some places. The injury is more noticeable in corn than in other plants, because the top fades quickly. I have found several other fields besides my own affected by this insect. The good corn weather which we have had recently, has pushed the plants on so fast that the effects of the borer are not nearly so apparent now as they were, and, apart from one or two pieces, the damage does not seem to be very great. Many other plants were affected in this neighbourhood besides the corn. I have found the caterpillars in potatoes, tomatoes, Canada Thistle, elder, lamb's-quarters, garden beans, ragweed and a few kinds of garden flowers.'

'July 7.—I was looking at 30 large tomato plants to-day which are just beginning to blossom, and I find 8 of them with borers in them.'

'July 13.—I found a worm yesterday just beginning to bore into a pigweed stem. When discovered, only his head was buried. In fifteen minutes he had buried in his whole length. I was surprised, too, to find a plant of sweet clover which as you know has a very tough stem, with three holes in it and two worms. They cleaned out the centre of the stem for about two feet. The early potatoes, tomatoes and most flowers and weeds do not show the effect of the borers, so quickly as the corn does, because they do not fade so easily. The corn in this section never grew more quickly than during the last two weeks. The effects of the worm are not so noticeable as they were a little while ago.'—G. W. Riseborough.

'Mount Brydges, Ont., June 30.—I send you specimens of a grub which is playing havoc with the potato and the tomato crop. They bore into the stalk and eat the heart out. I have taken dozens of them out of potato and tomato plants and of course the plant is done when the trouble is noticed.'—W. B. Dunn.

It is very seldom that a remedy is required for stalk borers in Canada. The number of specimens which occur in any one locality is, as a rule, small, and no remedies need to be applied. Whenever an injured plant is noticed, the borer should be sought for and destroyed; but I know of no treatment by which their outbreaks could be prevented. The presence of the larvæ in many kinds of weeds points to the advantage of keeping down all such useless and unnecessary vegetation.

The Corn Worm (*Heliothis obscura,* Fab.; =*H. armiger,* Hbn.).—This insect which always occurs in Canada in an irregular manner did no harm in the eastern provinces and in Ontario, but for the first time was complained of from Manitoba. The species was known to occur in the prairie provinces from moths which had been collected, but up to the present so little sweet corn has been grown for table use that no one had noticed its injury before this year. The first mention came to me through the *Nor-west Farmer,* early in September. The samples sent were grown by Mr. Neil Bayne, at Pipestone, Man., who sent several ears injured in the ordinary way, and also some of the caterpillars at work in them. Both the green and the brown colour varieties were represented. The brown were stated to have been much more abundant in the early ears of corn, to which they had done a great deal of damage. The attack came to an end about September 20.

Under date September 11, Mr. W. C. Hall, wrote from Headingly, Man.:—'I send an ear of sweet corn (Cory) and shall be obliged if you can let me know what grub this is, which is infesting a great part of the corn this year for the first time. Many ears are destroyed, the injury begins at the top.'

The most westerly occurrence was at Fairy Hill, Sask., from which place Mr. Robert Mollard writes: 'Sept. 4.—Inclosed you will find a cob of corn eaten by a grub, which is also in its place in the cob. This is the first year I ever saw corn affected in this way, and most of the cobs are similarly affected.'

It is only recently that the farmers on our prairies have discovered that they can grow excellent sweet corn for table use, and it will be most unfortunate if this troublesome pest should develop in such numbers as to induce growers to give up the culture of such a popular and wholesome vegetable.

The remedies which have been recommended, are the hand-picking and destruction of the caterpillars as soon as their presence is detected by the premature discoloration of the silk. It is also claimed that many moths may be taken at night in lantern traps consisting of a lighted lantern placed in an open pan containing water with a little coal oil on the top of it. When a crop is known to have been attacked by the Corn Worm, the old stems should be removed from the field as soon as the crop is gathered, and the land ploughed deeply in autumn so as to break up the cocoons and expose the pupæ to the weather and their various enemies among the small birds and mammals.

The Variegated Cutworm (*Peridroma saucia,* Hbn.).—In 1900 this large and late occurring species of cutworm did a great deal of harm to all kinds of vegetation on the Pacific coast, extending from Northern British Columbia as far south as Oregon. Very little injury has been recorded against it since that time; but during the past summer the caterpillars were found in noticeable numbers at several places in British Columbia, reports having been received from Mr. J. W. Cockle, of Kaslo, Mr. W. A. Dashwood-Jones, of New Westminster, Mr. R. V. Harvey, of Vancouver, and from Mr. J. R. Anderson, the Deputy Minister of Agriculture of British Columbia, who writes under date July 26:—'I regret to say that *Peridroma saucia* is again bad this year, not as numerous as in 1900, nor, as far as I can make out, so widely distributed. It is sufficiently bad, however, to induce me to send out the emergency bulletin, of which I send you a copy. It is remarkable how soon people forget what has been told them, and I have constant applications for information as to the best remedy. I am again recommending the Paris green and bran which did such excellent work in the last outbreak.'

Mr. T. N. Willing, of Regina, N.W.T., in reporting on the injurious insects of the year, states that the larvæ of this moth were very abundant during August at Regina, and he sent several of the moths, which he had reared from caterpillars in gardens at Regina.

The comparative abundance of the species in British Columbia should be turned to advantage by gardeners in that province to prepare themselves before next season with materials for poisoning the caterpillars, should they appear again in numbers next summer. If this is done there should be no great loss.

THE TURNIP AND CABBAGE APHIS (*Aphis brassicæ,* L.).—Reports relating to the Turnip Aphis from our own correspondents during the past summer were very few; but it is stated by Prof. James in his November Crop Bulletin as follows:—'The aphis popularly known as the turnip louse appeared in greater force (in Ontario) than for years and hindered the development of the bulbs, which several correspondents describe as being rather small and rooty. The cabbage worm or an insect resembling it also attacks the plant in different parts of the province. Favourable reports regarding the crop were rare.'

'Manilla, Ont., Dec. 1.—I started on an institute trip at Shelburne, Grey county, Ont., and came south and east. We heard great complaints about the Turnip Aphis destroying the turnip crop west of Toronto, but not much damage appeared to have been done east of that city. The early sown fields suffered most, and, so far as I could learn, those fields that were sown after June 20 appeared to be almost free from aphis. I have made it a point to sow my turnips for many years past from June 20 to 22, and we have never had any serious trouble with the aphis. Sometimes we could find a few plants in a place with some on, but not enough to injure even those to any great extent.'—HY. GLENDINNING.

There were also restricted but very serious outbreaks in some parts of British Columbia.

'St. Mary's Creek, Gang Ranch, B.C., June 12.—Kindly give me a cure for the lice that settle on cabbages and turnips, completely destroying them. They accumulate by millions. Last season was our first experience. They completely destroyed our whole cabbage plot. I have been in this country 47 years but I never saw them before.' —W. W. WYCOTT.

'Monte Creek, B.C., Aug. 16.—I send you a few leaves of Swede turnips covered with a pest which has spread terribly quickly and is now going from the turnips to the cabbages. Last year we had some of these, but they were not nearly as bad. It would seem as if the very hot weather and scarcity of water for irrigating is favourable to their increase.'—HEWITT BOSTOCK.

'Cash Creek, B.C., Sept. 23.—I send specimens of a pest which destroyed my turnip crop last year and threatens them again this. Kindly give me the name and some remedy if you know one. If there is none, we must give up trying to grow turnips.'—C. A. SEMLIN.

Reports of injury by this insect to rape came from Mr. George Wright, of Elora, Ont., and from Ottawa. Dr. Hamilton, of Mahone Bay, N.S., writes of its injuries in his locality as follows:—

'The turnip aphis was abnormally abundant this year, specially on cabbage. I heard of patches in which nearly every plant was affected. We have these insects in some numbers every year, but it is only at intervals and in special localities that the damage is very severe. Perhaps to this is due the fact that hardly anybody here seems to know of or apply the proper aphis-destroying mixtures which answer well for this as for other species.'

The Turnip Aphis and Cabbage Aphis are the same species. It was probably imported from Europe many years ago and is now a pest right across the continent. In British Columbia it is as a rule much more destructive to early cabbages and cauliflowers in gardens than is the case in the East, where its chief depredations are in turnip fields.

The remedies which have given the best results are the prompt spraying of the first colonies of the season as soon as they appear, with kerosene emulsion or whale-oil soap solution. Of great importance as a means of destroying large numbers of the eggs or of the plant-lice which may possibly winter over as such in Canada (they certainly do so in some parts in the egg condition) is the ploughing down deeply, the feeding off, or the removal from the fields of all leaves of turnips and cabbages as well as remnants of those crops.

THE RED TURNIP BEETLE (*Entomoscelis adonidis,* Fab.).—The usual accounts of slight injury to cabbages and turnips have come in from points in the North-west Territories and Manitoba. Mr. Norman Criddle reports the beetles as rather common at Aweme, Man., on radishes in gardens and on a native food plant, *Erysimum parviflorum,* on the open prairie. For the first time, however, injury by these insects has been reported from British Columbia, from Mr. H. E. Church, of Hanceville, and Mr. C. H. Norris, of Hazleton. The latter writes that it had given great trouble attacking turnips, cabbages, &c., and was worst on young turnips of which it stripped the leaves clean, leaving only the ribs. Specimens were even sent from Dawson, Yukon Territory, by Mr. W. J. Reynolds, who said that they had destroyed cabbages entirely, eating them right down to the stump, and were at the time of writing, July 26, eating the turnips to rags.

Any of the ordinary arsenical poisons for leaf-eating beetles have proved effective against the Red Turnip Beetle. It has been found that dry mixtures are more convenient for use on cabbages and smooth-leaved turnips, owing to their waxy covering. Should it be more convenient to use liquid mixtures, these can be made to remain on the surface of the leaves by adding about a pound of soap to every ten or fifteen gallons of wash.

THE CARROT RUST-FLY (*Psila rosæ,* Fab.).—It is some years since we have had a severe attack of Carrot Rust-fly as far east as Ottawa; but early last summer several occurrences were brought to my notice around Ottawa. Some of these were only slight attacks, but in other cases whole crops were destroyed. Strange to say, although so severe in early carrots, there was no appearance of injury when the roots were dug in the autumn. In Nova Scotia and New Brunswick this is a much more troublesome pest of the market gardener than it is further to the west; but even there it is intermittent in its attacks. Dr. C. A. Hamilton writes that in 1902 and 1903 one-half to three-quarters of his carrots at Mahone Bay, N.S., were destroyed by it. In 1904 and 1905 he did not see a single damaged root, although the carrots were sown in the same garden. Notwithstanding this immunity in his garden in 1904, several of his neighbours suffered severely. During 1905 there was practically no injury.

The treatment which has given good results in preventing injury by the Carrot Rust-fly, is to sow as late as possible and when thinning out carrots, to do this late in the day and then spray the rows at once with a deterrent wash such as kerosene emulsion or a carbolic wash. The time when most injury is done is in June and July, so that two or three sprayings, a week apart, will generally protect the crop from injury in ordinary years. Should maggots be found in stored carrots, the sand in which these roots have been kept for the winter should in spring be treated in some way that will insure the destruction of the puparia or will at any rate prevent the emergence of the flies. This may be done either by burying it in a deep hole or by throwing it into a pond or into a barnyard, where it will be thoroughly trampled by stock.

THE DIAMOND-BACK MOTH (*Plutella maculipennis,* Curtis).—The small active caterpillars of this moth were abundant and destructive in many places during 1905. They did considerable harm in rape fields and on Swede turnips and cabbages, and occurred at various places from Nova Scotia to British Columbia. I have no record of widespread or very serious damage in the East, but there is every indication that, if the summer had been a hot and dry one, the loss would have been very great. As it was, the frequent and copious rains in those places where the outbreaks occurred, enabled the plants to make such vigorous growth that the attacks of the caterpillars were of small moment. It is well known that moisture and continued damp weather are detrimental to this insect. Dr. C. A. Hamilton found the species very abundant for several miles round Mahone Bay, N.S. It also occurred in Prince Edward Island. at Youghall, near Bathurst, N.B., at Ottawa, and at several places in Manitoba, the North-west Territories and British Columbia.

The remedies for this insect are dusting the plants infested with a dry Paris green mixture consisting of one pound of Paris green in twenty-five of lime or wood ashes, or spraying them with kerosene emulsion or a whale-oil soap solution. To allow of the mixture being thrown well up under the leaves such a convenient implement as has been given to me by Mr. Geo. E. Fisher, of Freeman, Ont., should be used. This consists simply of a short length of metal pipe bent in the middle to the required angle and having the nozzle attached to one end. As a supplementary treatment inducing a vigorous growth, light dressings of some quick acting fertilizer such as nitrate of soda, hoed in round the roots of the plant, are of great advantage.

THE CUCUMBER AND POTATO FLEA-BEETLE (*Epitrix cucumeris,* Harr.).—A serious enemy to potatoes, but one which is frequently overlooked, is the so-called Cucumber Flea-beetle. This minute dusky-black hopping beetle, about one-twelfth of an inch in length, appears early in spring and again about the beginning of August, and sometimes in such numbers that it becomes a serious check to potatoes, tomatoes and all kinds of cucurbits or members of the Gourd family. A remarkable outbreak of this beetle occurred in Nova Scotia last August.

'Mahone Bay, N.S., August 14.—We have the Cucumber Flea-beetle here on potatoes more or less plentifully every year especially in June; this spring, however, I thought they were not as abundant as usual. On August 3 I looked over my potatoes for the Colorado Potato Beetle and do not remember seeing any flea-beetles at all. On August 5 one side of the patch was simply alive with them, and by the next day they had spread over the whole patch. I partly counted and partly calculated the number and found them to average about 800 to each plant. By the 9th they had destroyed between a quarter and a half of the leaf surface of the side of the patch first attacked. That afternoon I gave them a dose of poisoned Bordeaux mixture. On the 11th they had practically disappeared. A neighbour's potatoes about 150 yards away were nearly as badly infested as my own. I have an idea that the poisoned Bordeaux mixture may act rather by driving the beetles to adjacent vegetation than by killing them. After they left the potatoes they turned their attention to cucumbers, beans, pumpkins, squashes and tomatoes which were badly eaten. On account of this troublesome pest it is almost impossible, without the most careful attention, to raise tomatoes here from seed sown in the open, because they sweep away the young plants as soon as they appear above the ground.'—C. A. HAMILTON.

The efficacy of the poisoned Bordeaux mixture for this insect was discovered by Prof. L. R. Jones, of Vermont, in his very thorough experiments with Bordeaux mixture against the Potato Rot. It is probable that the copper sulphate in this composition does have much effect in rendering the foliage distasteful to the beetles; but there is also little doubt that great numbers of the beetles eat the foliage and are poisoned. This useful remedy is suitable for application to all of the plants mentioned above and is also useful upon them in preventing fungous diseases which regularly attack them.

THE SUGAR BEET WEBWORM (*Loxostege sticticalis,* L.).—In my report for 1903 I referred to an outbreak of the Sugar Beet Webworm in the West and treated it at some length, so that in case of a future outbreak those who are now turning so much attention to the cultivation of the sugar beet in the Cardston district of Alberta, might be prepared. During the past autumn I received an account of a local occurrence in that district. Mr. J. B. Merrill, who is a most progressive farmer and fruit grower at Magrath, Alta., writes on August 25:—'I send you by this mail specimens of worms which are destroying our beet crops here at an alarming rate. I take them to be the Sugar Beet Webworm of your 1903 report. What had we better do to control them? We are spraying them with Paris green now, but the beets are stripped of their leaves. Do you think that they will survive the attack and be of any use?'

Mr. Merrill was written that he had applied the right remedy and that the plants would certainly revive, but would be injured to the extent that the leaves had been destroyed, and that, although the roots would be reduced in size, they would probably still give a paying crop. That this proved to be the case is shown by a later letter from Mr. Merrill:—

'Magrath, Alta., Nov. 3.—I have to day delivered the last load of my beets on the cars, so am now in a position to answer your questions. I had a very good stand of beets on my 17 acres. Towards the end of August, after a three days' absence, I was surprised to find the plants covered with worms. Part of the field had been irrigated. Here the plants were not as badly affected as where they had no water. These latter were swept clean, but they afterwards started a new growth of leaves, and from this part of the field I harvested only four tons to the acre; but the watered beets yielded 13 tons to the acre. When ploughing up the beets, we found enormous numbers of the worms about two inches under the surface of the soil. These we hope to destroy by winter cultivation. I think that the moths must have come from an adjoining lucerne patch.'

THE SPINED RUSTIC (*Barathra occidentata,* Grt.).—During the month of July a great many different kinds of plants in gardens were attacked at Ottawa by large, smooth, cutworm-like caterpillars, which were at first greenish in colour, having the body divided into two equal areas above and below the spiracles. The upper of these areas, or the back of the caterpillar, was darker by reason of some black patches, and the under side of the body was of a yellowish hue. These rather inconspicuously marked caterpillars were largely nocturnal in habit, coming out at night and feeding singly on nearly all kinds of vegetation, but being particularly destructive to the seed pods of larkspurs and to the foliage of the bleeding-heart (*Dielytra spectabilis*). In the vegetable garden, spinach and cabbages were most attacked. After the last moult, about the middle of July, these caterpillars were much more conspicuously marked, presenting a handsome Mamestra-like appearance, with three lines down the back and with each segment ornamented with large velvety black patches; the head is honey-coloured and mottled. When full grown these caterpillars are very voracious. They are about two inches in length, cylindrical in shape like cutworms and attain a diameter of nearly ¼ of an inch. There is great variation in their colours, some specimens appearing to be almost black while others have a dark olive green aspect; but all specimens show a distinct band along the sides below the spiracles, which is clear yellow in colour, marked centrally with red. These caterpillars were the progeny of a noctuid moth which up to the present time has been a very rare species in all collections of insects. It has been identified for me by Dr. J. B. Smith, as *Barathra occidentata,* Grt., an insect which is so rare that the only two specimens I had ever seen were two reared by Mr. Guignard from larvæ which he had found upon larkspurs in his garden in 1898. Mr. C. H. Young, of Ottawa, an energetic collector of moths, also took a single specimen on June 6 of the same year, and another one the following year on

June 19. During last summer, while collecting moths at Ottawa, we found that this species was well represented among captures which we made during the month of June around electric lights; and several more specimens were collected hiding away in dark corners of offices and out-buildings. A few weeks later than this, caterpillars were found in great abundance out of doors on various kinds of plants. These we were able to identify by comparing them with specimens which we had reared from eggs laid by captured females. We were fortunate enough to work out the whole life history of the species. There is only one brood in the year, the eggs being laid in June and July and the caterpillars feeding through July and into August. When full grown they bury a few inches beneath the surface of the ground and change to shining brown chrysalids, from which the moths do not emerge until the following June. The moth is a handsome insect, expanding over an inch and a half when the wings are open. The upper wings are a dark silvery gray, so thickly checkered and marked with waved blackish lines as almost to hide the ground colour; hind wings silvery gray clouded with fuscous on the outer half. Near the end of the upper wings is a waved white line. The outer or kidney-shaped of the two marks which are characteristic of noctuid moths, is margined with black and is boldly marked with white; but the other, the orbicular, is hardly perceptible from the other marks of the wings. On each of the upper wings are three rather large suffused pale, bronzy areas, one close to the base, and the other two towards the upper and lower angles. The upper of these lies beyond the kidney-shaped mark and just inside the waved white line which runs down inside the outer margin. The thorax and abdomen are crested and of the same colour as the general tone of the wings. The genus *Barathra* to which this moth belongs, is easily distinguished from its near relatives by the presence of a long curved claw on the outer side of the tibiæ of the front pair of legs.

Not only did this insect occur in abundance at Ottawa, but specimens were sent from Mahone Bay, N.S., where my energetic correspondent, Dr. C. A. Hamilton, makes many very valuable observations for me. Dr. Hamilton found the caterpillars when they were quite small, upon cabbages, turnips, cauliflowers, corn and sweet pease. They were, at the time he first wrote, July 23, quite small, and were of the green colour which characterizes the first stages. Like the larvæ of many other noctuids, while very young, they resemble in shape and manner of moving those of the geometer moths. Dr. Hamilton writes:—'Aug. 11.—I am sending you some more of the caterpillars which I find on my cabbages and cauliflowers. I have also found them on sweet peas and on one small patch of Kohlrabi. I also send a few from corn. I have examined nearly all the patches of these vegetables about this village and from one to six miles out in various directions, and have found them present in all but a few cases. The damage, on the whole, is not very great, the worst perhaps being in a small patch of cabbage in which I counted 14 out of 70 plants, so badly eaten as to be worthless. A few other patches were nearly as badly injured, but most had only from one to five per cent noticeably affected. Turnips were infested to about the same extent. Cauliflowers are not much grown here, but I saw many plants almost ruined. The attacks were confined almost entirely to the cultivated Cruciferæ. Fresh batches of young were being hatched from the egg until up to about August 1.'

Moths of this species were taken at Lévis, Que., by the Rev. Dr. Fyles, and I found the caterpillars in great numbers stripping a patch of cabbages in the garden of Mr. W. McKirdy, at Nepigon, Ont., on August 21. These were very much later than at Ottawa, where most of the larvæ had attained full growth two or three weeks sooner.

As a remedy for this insect, almost any of the ordinary applications for leaf-eating insects would answer; but I found them less susceptible than I supposed would be the case, to an application of pyrethrum insect powder. There is, of course, the possibility that the powder may not have been good; but it did not kill the caterpillars as quickly as is the case of most other similar caterpillars upon which I have tried it. The poisoned bran mash answered well at Ottawa.

FRUIT CROPS.

The fruit crops from one cause or another were somewhat irregular, except in British Columbia, where they were well up to the average and of high quality.

In Ontario, although a good crop of apples was marketed, there were districts where they were poor. This was thought to be largely due to the severe winter of 1903-4, followed by the very heavy crop of last year, followed again by the hard winter of 1904-5. Apples in the Ottawa district, where the orchards had been sprayed, were of high quality and abundant. Heavy wind storms in October reduced the yields of first-class fruit to some extent.

The St. Lawrence and Ottawa valleys and the Eastern Townships of Quebec gave good crops of autumn and early winter apples, but very light crops of winter varieties.

Mr. A. McNeill, Chief of the Fruit Division of the Department of Agriculture, in summing up the apple crop for the year says:—'The Dominion, as a whole, will produce about one-third as many apples as last year. The fruit will be freer from scab, but somewhat more injured by Codling Moth. The favourable weather of autumn allowed the numerically small crop of apples on the trees to fill up better than usual; and, although the apples are on the whole rather small, they are clean and of good quality, and probably the final result will give average paying returns to the growers.'

The apple crop in Nova Scotia is reported as being below the average on account of a heavy frost in June, which injured the blossoms; nevertheless, it is estimated that there were probably four hundred thousand barrels for export and the local market, worth at current prices close to one million dollars.

Mr. S. C. Parker, Secretary of the Fruit Growers' Association of Nova Scotia, reports on the crops of the celebrated Annapolis Valley, N.S.—'Apples: crop fair, probably 75 per cent of average, quality varying from good to very poor; fungi quite bad although thorough spraying gave some clean orchards. The pear crop was large, but of rather poor quality. Plums and small fruits gave good crops. A severe frost on June 6 did much injury to blossoms, and perhaps easterly winds and dull weather during the blossoming period did more. Early fall frosts injured the cranberry crop somewhat. A sharp freeze on October 26 ruined many hundred barrels of unpicked apples. Season was very favourable except for one or two frosts.'

Losses from the attacks of injurious insects were less than usual in all parts of the Dominion, owing to the much greater attention which is now being given by fruit-growers to spraying and other advanced methods of orchard management. Peaches in the Niagara district and in British Columbia, where grown, were a heavy crop. Much the same may be said of pears and plums. Plum rot and curculio are mentioned in Northern Ontario reports. The grape crop of Ontario was heavy, and as there were no killing frosts till very late, the fruit ripened well.

Small fruits almost everywhere gave fairly good crops. The insects which were oftenest mentioned as injuring fruit crops were the San José Scale, the Codling Moth, the Apple Woolly Aphis, which has been more abundant than for many years, the Apple Aphis, the Oyster-shell Scale, and the Cherry Slug. The Apple Maggot mentioned in my last report as present at Como, Que., was this year much more prevalent in that locality, and a special effort was made to apprise the fruit growers of the best remedial measures and the danger of neglecting to attend to the matter at once.

Notwithstanding the magnificent crop of fruit gathered in British Columbia, there was considerable injury done by regularly occurring insect pests. The Woolly Apple Aphis and the Green Apple Aphis were very abundant in some places and did noticeable injury. According to Mr. R. M. Palmer, who has excellent opportunities for examining the crops throughout the province, the Eye-spotted Bud-moth has been worse than for many years in the Victoria district. The injury of this caterpillar was also much augmented by a late frost in May. Mr. Thos. Cunningham, the Inspector of Fruit Pests, reports the Lesser Apple Worm as abundant and destructive at Kamloops and Trail.

THE SAN JOSÉ SCALE (*Aspidiotus perniciosus,* Comstock).—Much has been written recently in newspapers and magazines on the San José Scale injury in Ontario, but there is, as a matter of fact, little change in the condition of our orchards in Ontario since last year. This in itself is not satisfactory, because, where careful commercial growers have attended to their orchards properly, and have used the recommended remedy, good clean crops have been harvested. There are, however, a great many small growers and private individuals who do nothing at all against the scale, and consequently it holds its own. The Federal Government still maintains at considerable expenditure fumigation stations, by which any danger of the introduction of infested stock is prevented. The Provincial Government of Ontario and the leading nurserymen are making every effort to avoid the distribution of infested nursery stock, and, if a greater effort were put forth by all concerned, this dire enemy of the fruit grower could certainly be reduced very much in numbers.

I regret to have to state that I have this year received specimens of the San José Scale from two localities in British Columbia. The attention of the Provincial Government has been drawn to the matter, and the few trees which are infested in both cases will be destroyed before another season opens. The first of these was discovered by Mr. J. W. Cockle, of Kaslo, B.C., a keen entomologist and one therefore well able to detect the enemy and give advice to the owner of the trees. It is satisfactory to find that in both of these cases the trees have been planted for a long time and date back previous to the enforcement of the San José Scale Act and the establishment of the fumigating stations.

For the San José Scale more careful treatment and persistent effort is necessary than for many other insects the fruit grower has to deal with. The standard remedy is the lime and sulphur wash which has so often been mentioned in these reports and for the making of which and instructions in its application, necessary information will be given to any one who applies for them. Prof. J. B. Smith of New Jersey recommends very highly two recently sent out proprietary mixtures : Kil-o-scale and Scalecide, which have given good results with him. They are petroleum preparations which have been prepared largely under Dr. Smith's supervision.

THE CODLING MOTH (*Carpocapsa pomonella,* L.).—The Codling Moth, which on the whole, perhaps, is the worst enemy of the fruit grower, has levied a heavy toll as usual in unsprayed orchards; but, wherever thorough work has been done in spraying regularly with the poisoned Bordeaux mixture, good results have almost invariably followed. In every part of eastern Canada where apples are grown, reports speak of injury by this insect and, as is pointed out by the Rev. Father Burke, possibly the comparative scarcity of fruit this season makes the injury by the Codling Moth seem more apparent. There is now not the slightest doubt that in all parts of Canada east of Toronto spraying orchards regularly with poisoned Bordeaux mixture, three or four times in spring, the first application to be made within a day or two after the blossoms fall and the subsequent sprayings, each ten days apart, is a satisfactory and well paying remedy for the Codling Moth. A striking instance of the value of regular spraying, year after year, was this year to be seen in the orchard of the Central Experimental Farm at Ottawa, where not an apple injured by the Codling Moth was to be found, whereas, on the other hand, in orchards just close by, where no spraying had been done, more than half the crop of apples was destroyed, also in the Botanic Garden, which lies about half a mile on the opposite side of the orchard, in the collection of wild apples and crabs, the fruit was severely infested. These it had not been considered worth while to spray, as the trees are merely grown for ornament.

The Codling Moth is normally single brooded at Ottawa and the double brooded habit of the species is not general east of Toronto. In 1905 I had an opportunity of rearing a considerable number of the larvæ and was much surprised to find that some of these after spinning their cocoons changed at once to pupæ and gave forth the moths soon afterwards. These, however, formed only a small percentage of the whole, for by far the larger number remained in the larval state and will not pupate until next spring. The above larvæ were full grown and began to spin up July 25, and I am of the opinion that not only at Ottawa, but at some other places in eastern Canada where a partial second brood was this year noticed, this premature development of the moths was due to about a fortnight of excessively and exceptionally hot weather in July as they were nearing full growth.

West of Toronto, in addition to regular spraying, banding the trees with burlap bands to catch the larvæ of the first brood when they spin up is necessary.

It has long been a matter of wonder that the Codling Moth, which is so abundant in the States of Oregon and Washington, should not have established itself as an injurious fruit pest in British Columbian orchards. Although carefully sought for, no instance of apples infested by this insect have been detected until the present season. An insect which causes a somewhat similar injury, the Lesser Apple Worm [*Enarmonia* (Grapholitha) *prunivora*, Walsh] has frequently in the past been mistaken for the Codling Moth in British Columbia; but, with the exception of a single specimen of the moth sent to me by the Rev. J. H. Keen, from Metlakatla, B.C., where no apples are grown, and which he had found in his house, I have never been able to learn of the occurrence of this insect in British Columbia until Mr. J. W. Cockle, of Kaslo, B.C., sent me this autumn an undoubted specimen of the Codling Moth, which he had reared from infested apples growing in an orchard at Kaslo. It is deeply to be regretted that this insect has found a foothold in British Columbia, although this at some time was almost inevitable, from its abundance in orchards to the south. It is well for the province that Mr. Cockle, being a trained entomologist, should have been able to detect both this insect and the San José Scale before they had spread further. The matter has been brought to the attention of the Provincial Government and it is their intention to deal with both of these occurrences before another season opens.

The Woolly Aphis of the Apple (*Schizoneura lanigera,* Hausmann).—An insect which has been strikingly more abundant during 1905 than it has been for many years, is the Woolly Aphis of the Apple. This has been noticed all through Ontario and Quebec, and Mr. R. M. Palmer tells me that it has been more destructive in British Columbia than for many years. The injury by the Woolly Aphis is sometimes very severe in the United States, particularly by the root-inhabiting form of the species; but it has never been a very serious pest in Canada; even in British Columbia, where it is regularly much more abundant than in the East, it is less destructive than the Apple Aphis and some other well known enemies of the fruit grower. The eradication of this pest when it has established itself upon the roots of apple trees in an orchard, is a difficult matter. The methods which are usually adopted, are the uncovering of the roots and pouring in hot water almost at the boiling point, or the injection into the soil of bisulphide of carbon. Another method which has been highly praised, is digging in tobacco dust around the roots. This material can be purchased, it is claimed, from cigar factories at a reasonable amount, and, when this does not exceed one cent per pound, the tobacco is worth fully that price as a fertilizer. The form which occurs in Canada most widely, is that which may be seen during the summer and autumn gathered together in white woolly clusters on the shoots from the base of the trunks of neglected trees and upon the branches, where they cause swellings in the bark by sucking the sap and at the same time poisoning the tissues. In the vicinity of Ottawa the wild hawthorns were even more seriously attacked than apple trees in orchards, although some of these latter were so infested that one correspondent spoke of them as presenting the appearance of having been whitewashed.

The remedies for the form which occurs on the branches, are the same as are used for ordinary plant-lice; but, as these are protected by a waxy covering, it is well to apply the liquid with considerable force and also to have it mixed with hot water which gives it greater penetrating power. A kerosene emulsion may be made for this purpose, of the standard Riley-Hubbard emulsion diluted with six, instead of nine parts of water. Whale-oil soap solution should be applied hot and one pound in five gallons of water.

THE APPLE MAGGOT [*Rhagoletes* (Trypeta) *pomonella,* Walsh].—In the autumn of 1904 an outbreak of the Apple Maggot, known also in the New England States as 'the railroad worm,' was detected in some of the apple orchards at Como, Que. During the past season it has been found that the insect has established itself in many other orchards surrounding the first point of injury.

As there are several large and valuable orchards in this locality, much anxiety was felt by the owners of these, that the habits of the insect and the best remedial treatment should be made known to all apple growers of the district, so that by concerted action the outbreak should be controlled before more loss accrued. With this object in view, I visited Como early in October, and examined several of the orchards under the guidance of Mr. R. W. Shepherd, who kindly put himself at my disposal and accompanied me, and also helped me in many other ways to get into touch with the owners of several orchards.

One of Mr. Shepherd's own orchards had been affected last year, and this summer he had faithfully carried out suggestions of control based on the experience of those who had suffered from the Apple Maggot in other places.

All windfalls had been fed to cattle, and a herd of pigs had been kept in the orchard throughout the summer. It may be well, however, to point out, as the experiment will be anxiously watched by his neighbours, that some badly affected crab apple trees were in a sense overlooked, the fruit of which was thoroughly infested at the time of my visit. It would appear that the fruit of this class of apples does not fall from the trees when attacked, to the same extent as the larger apples. At that time, however, Mr. Shepherd at once had the fruit of these trees threshed from the boughs and destroyed. A circular letter giving the nature of the pest and advice as to the best treatment of infested orchards was at once prepared and a copy sent to every apple grower in the district. Notwithstanding the severity of the outbreak, the experience of others who have suffered loss from the Apple Maggot, would seem to give reasonable ground for hope that much may be done to reduce loss. The following letters from the State Entomologists of Maine and New Hampshire respectively, show that good results have followed the adoption of the best, so far, recognized method of prevention. The insect has been present in these States for some years.

'Agricultural Experiment Station, Orono, Me.—Your letter concerning the Apple Maggot is received. There seems to be no marked change from year to year in the occurrence of this pest here. We have in the State numerous orchards in which the trees have not been pruned for a generation at least and in which the windfalls lie ungathered. The owners of such orchards frequently complain that the trees might as well be cut down, for the "Railroad Worm" gets all the apples. On the other hand, *none of the leading orchardists seem to feel that the case is hopeless.* They recognize the Apple Maggot as a pest to guard against and believe that care in putting the windfalls out of the way is the only practical method of doing it. Thus, it is no uncommon situation to have well cared for orchards where infestation by *R. pomonella* is almost unknown, while within a few miles the owners of neglected trees say that for years they have not gathered a crop. There is one notable case of this sort in the southern part of the State, where in the midst of an infested area a very large orchard ships perfect apples every fall and no loss is caused by the maggot.

'A few successful orchardists think it pays to keep a few sweet apple trees scattered about as traps, as the flies seem always to deposit in these by preference; and the whole situation is sometimes handled by sacrificing some sweet fruit and subsequently destroying this infested lot. I trust that the outbreak near Montreal will not prove so serious as it seems at present.'—EDITH M. PATCH.

'New Hampshire College of Agriculture and the Mechanic Arts, Durham, N.H.—I have not heard of any serious trouble from the Apple Maggot this year, although it is quite common in our summer apples. I think it is somewhat worse this year than last year; but it has not caused any very serious injury, so far as I have heard. It becomes seriously injurious periodically.'—E. D. SANDERSON.

THE BUFFALO TREE-HOPPER (*Ceresa bubalus*, Fab.).—A great many specimens of rough and gnarled twigs of apple trees have been sent in from time to time, but more frequently during the last year or two, which were due to the injuries caused by small grassy-green homopterous insects that bear on the thorax two horns which are supposed to give it a resemblance to the buffalo. The only harm done by this little insect to orchard trees is by the egg-laying females, which cut two semi-circular gashes right through the bark deeply into the wood, and into each of which they insert from five to ten eggs. Each female lays between one and two hundred eggs, and consequently makes several of these gashes before she has deposited her whole supply. The eggs remain in the wood and do not hatch until the following June; each egg is about one-sixteenth of an inch long, slightly curved and yellowish white in colour. When the young hatch, they crawl out of the egg-shell which remains in the wood and prevents the wound from healing up for a long time. Young twigs of two or three years old are frequently selected by the females for ovipositing, and, if there are only a few of the scars, little injury is done; but it seems to be a habit of this insect to work somewhat in company, and frequently a single tree may be found with a great many egg-deposits in the wood, while others close by are untouched. The two slits almost meet each other but do not quite touch at the top and bottom, but the small piece of wood and bark between them dies and, together with the empty egg-shells, prevents the healing of the wound, so that, where there are many deposits on the same tree, the injury is serious and a check is sometimes given to young trees, which they do not get over.

The Buffalo Tree-Hopper while young lives chiefly upon the sap of weeds and other coarse vegetation, and very little of its food is derived from the apple trees where the young larvæ are first hatched. For a few days, at any rate, after they have first hatched, they may be seen on the trees running quickly round the branches and hiding whenever looked at. At this time, which, however, does not last for many days, good work may be done by spraying the infested trees with kerosene emulsion or whale-oil soap. It is very difficult to reach the eggs by any winter treatment, but probably spraying with crude petroleum or an emulsion of that oil might be applied without injury to the trees. The remedy recommended by Mr. C. L. Marlatt, the First Assistant United States Entomologist, is the limiting of the amount of foreign vegetation about and in orchards and nurseries. He thinks that little damage may be anticipated where the ground between the trees is kept clean and constantly cultivated. Vigorous pruning in winter, by which as many as possible of the egg clusters are removed, is also advised. The mature insects seem to be attracted by beans and some other low-growing vegetables. These then might be planted in orchards between the trees as trap plants to be afterwards sprayed with strong mixtures of kerosene emulsion or whale-oil soap, when the larvæ, nymphs or adults are seen to be numerous enough upon them to make it worth while. The time recommended by Mr. Marlatt is about July 1.

THE WESTERN HARVEST-FLY [*Cicada* (Platypedia) *putnami*, Uhler].—An extremely common insect in most parts of British Columbia, is a species of Cicada of about the same size as the well known *Cicada septendecim*, L., of the United States. This latter is known under the erroneous name of Seventeen-year Locust, but, so far as I can learn, has been never or very seldom taken in Canada. The Western Cicada is enormously abundant nearly every year in Vancouver Island in June; and I have found it in like numbers in the Kootenays, particularly at Nelson, where in the beginning of July in 1896 the shrilling of the males among the aspen poplars and willows on the mountain side above the town was almost deafening. The species occurs right across the mountains, as I have specimens from Banff, and last year Mr. Dalton Tipping sent me a specimen which he had taken at Blackfalds, in Alberta.

Up to the present season no injury to cultivated trees had been complained of in British Columbia, but on July 3 last, Mr. E. Hulme, of Rock Creek, in the Boundary District, B.C., sent me samples of apple branches which had been punctured by the egg-laying females. As in the case of the other species of the genus, *C. putnami* lays its eggs in deep slits made into the wood of various trees; but the young do not feed on the wood or foliage of the trees where the eggs pass the winter; on emerging, they fall to the ground and burrow into the earth, where they attack the roots. Mr. Hulme stated that his young apple trees had been planted four years, and he had not previously noticed any injury; but this year some of the branches had been cut in four or five places.

It is hoped that this may be only an accidental injury to apple trees; but British Columbia is now becoming such an important fruit producing country and such large areas are yearly being cleared and planted to orchards, that any insect which is likely to develop into an enemy of the fruit grower is worthy of attention.

THE SLEEPY WEEVIL (*Otiorhynchus ovatus,* L.).—In my last report reference was made to the attacks of the larvæ of this weevil on the roots of strawberries. The insect occurs right across the continent and is frequently sent to the Division for information concerning its habits; but this is usually on account of the frequency with which it is found crawling about inside houses. Complaints of injury to vegetation are seldom made; but occasionally the damage done by the larvæ is considerable. Mr. E. McTaggart, of Hatzic, B.C., wrote as follows last spring:—'May 3.—I am sending a box containing a number of small white grubs. This insect has been working for the past three or four years in our strawberries, feeding on the small white root feeders. They bid fair to put us out of the strawberry business, unless we can find some way to control them. This will be a serious loss; for strawberries are our most important crop.'

Specimens sent from British Columbia previously, showed that the larvæ of the Sleepy Weevil have also the habit of boring cavities into the caudex or short underground stem of old strawberry plants, in the same way as, and frequently in company with, the larger larvæ of the Black Vine Weevil (*Otiorhynchus sulcatus,* Fab.). Mr. McTaggart was advised to adopt the 'one-crop method' of growing his strawberries, by which finer berries are produced and the beetles are prevented from increasing. I find also that large numbers of the mature beetles may be trapped by putting shelters, such as small flower-pots with a little hay in them, inverted and raised from the ground on short pegs, about the beds. The beetles are largely nocturnal in habit and will make use of these shelters for hiding in by day. They can be easily cleared out by taking each pot off the peg and shaking the hay over a pan or pail with a little water and coal oil in it. They are remarkably sluggish insects and make no effort to crawl away by day.

Father Burke sent specimens from Alberton, Prince Edward Island, which he had found eating cavities into low growing apples; many fruits trailing on the ground were damaged. He had also found the beetles in the blooms of dahlias and eating the leaves of the wild buckwheat.

Mrs. Thomas Sharpe, writing from the Experimental Farm at Agassiz, B.C., on August 9, sent specimens of the Black Vine Weevil which had been found very plentifully on the raspberry bushes, and also several Sleepy Weevils which she said 'we find all over the house. Do we carry them in on our clothes from the garden or are they some destructive house insect ? We are quite alarmed at the numbers of them which we find about the floors.'

It is probable that some of these may have been carried into the house from the garden; but these insects have a well marked penchant for crawling into houses and other places where they are decidedly objected to by housekeepers. Neither the Black Vine Weevil nor the Sleepy Weevil have wings; so they cannot fly like most other beetles and can only move from place to place by crawling.

THE STRAWBERRY WEEVIL (*Anthonomus signatus,* Say).—It is some years since a bad outbreak of the Strawberry Weevil has occurred in Canada; but in June last I learnt from Mr. Sydney H. Preston, of Clarkson, Ont., which is a few miles west of Toronto and an important strawberry producing district, that a great deal of damage was being done in the extensive strawberry plantations of that locality. Mr. Preston writes:—

'Clarkson, June 9.—I inclose some strawberry blossoms cut by the insects which are sent with them in the box. They are doing a great deal of damage in this locality.'

'June 17.—I grow only a few strawberries for my own use and have not seen the weevils on my own place, though I find many buds and blossoms and small berries cut through the stem, as in the inclosed sample; but my neighbours are all large growers and the complaint of damage is general. The cutting of the fruit stems is also attributed to this insect, but possibly that may be a mistake. Last season was the first in this locality that the injury was noticeable, and many growers then feared that their crops would be ruined. However, there seemed to be an abundance of fruit in spite of this.'

The habits of the Strawberry Weevil are interesting. It passes the winter in the mature beetle form, and, just before the flowers of the strawberry unfold, the insects fly to the strawberry beds and may be found in large numbers upon the flowering stems. When the female lays her eggs, she punctures a closed bud, for which purpose she generally chooses the earliest and largest. This is done with her sharp and slender beak, and the hole penetrates to the centre of the bud. She then deposits a single egg, pushing it down into the hole. Having done this, she crawls to the stem of the flower and gnaws it nearly through, so that the bud hangs down and eventually drops to the ground. Inside the cut off bud the young grub hatches and passes through all of its stages, the dead flower remaining closed around it as a protection. When the grub is full-grown, it forms a brittle cocoon of the debris, and in about a month from the time the egg is laid, the perfect beetle eats its way out. The new generation of beetles may frequently be found at Ottawa in the latter half of July and early in August. There is only one brood of this beetle, as far as known, and, as all the beetles disappear suddenly in the beginning of August, it is supposed that they go into hibernation at that time, hiding away beneath moss or among bushes and perhaps in woods, where they remain in a lethargic condition until the following spring. The varieties of strawberries chosen by the females for egg-laying are always those which produce pollen in considerable quantities, and it is chiefly upon the pollen that the larvæ feed. Varieties of strawberries with entirely pistillate flowers are not attacked; consequently, when the Srawberry Weevil is abundant, growers will do well to plant pistillate varieties as much as possible, and only enough plants of varieties which produce perfect flowers (which have both stamens and pistils) as will ensure the proper fertilization of the fruit. The number will to a large measure depend upon the variety grown and the number of flowers produced. Among the standard varieties of strawberries most highly recommended by Mr. W. T. Macoun, the Horticulturist of the Central Experimental Farm, the following may be mentioned as having proved the most satisfactory for general purposes, after being tested for several years:—

Pistillate.	Perfect.
Sample.	Glen Mary.
Buster.	Beder Wood.
Bisel.	Enhance.
Greenville.	William's.
Marie.	Lovett.
Warfield.	Pocomoke.

A reference to the good qualities of each of these varieties is made in the Report of the Horticulturist for 1904 at page 121.

Many experiments have been made to discover a practical remedy for this troublesome insect, which at different times has done a great deal of harm in Canada. Many years ago I suggested covering the plants just at the time the beetles appear, with gauze, cheese cloth, or even paper; but these methods all have the very great disadvantage of excluding the swarms of flies, bees and other insects which frequent the flowers and aid in the fertilization. Trapping the mature beetles when they fly to the plants, it is claimed, has produced good results. For this purpose the pollen-bearing plants should be planted in rows so that they may be sprayed when found to be covered with the beetles, either with a whale-oil soap solution or a kerosene emulsion. As has been pointed out by Mr. F. H. Chittenden, in an excellent bulletin on this subject (U. S. Div. of Ent. Circular 21, 2nd series, 1897), 'for the complete success of this method, it is essential that the non-fertilizing plants (the main crop) should be perfectly pistillate and bear no pollen at all.'

THE CURRANT MAGGOT (*Epochra canadensis,* Loew.).—Injury to currants both black and red by the larvæ of the Currant Fly are somewhat frequent in the West, and, unfortunately, up to the present time no very satisfactory remedy has been devised. The only treatment which has given any results, is the laborious one of removing about three inches of the soil from beneath bushes which had been infested, replacing this with fresh soil, and then treating the infested soil containing the puparia, in such a way that when the flies mature they cannot emerge. The following letters were received during the past summer:—

'Rock Creek, B.C., June 27.—I send to-day samples of gooseberries and currants which are affected with white maggots. I should like very much to know what we can do to avoid this pest. Last year we tried spraying with quassia chips and whale-oil soap solution, from the time the blossoms opened out; but it did no good whatever. The fly seems to lay her eggs when the berry is almost full grown. We have over 100 bushes and all are a complete loss. We have tried putting unslaked lime under the bushes, and we keep them well trimmed up; in fact, some of our currant trees are two and a-half feet high, but all are affected in the same way.'—MRS. BART INGHRAM.

'Indian Head, N.W.T., July 3.—I send you a few currants to show you how badly affected they are. At least half the crop was stung early in the season and fell off. Those that remain on the bushes, are in the condition of these I send you. In a recent trip through Kinistino, Melfort and the other districts around Prince Albert, through which we travelled together five years ago, I noticed that the currants were all affected in the same way. It would be of advantage, I think, if you could advise farmers what to do to save their fruit.'—ANGUS MACKAY.

'McLean, Assa., July 3.—I am sending a few currants which are infested with some insect. They are beginning to fall off now. This is the third year they have been infested; but I can't find out what kind of insect it is, although I often hunt for it.'—W. J. FANNING.

The maggots are very hard to recognize when at work in the currants, and many correspondents, like Mr. Fanning, have had difficulty in detecting them. They were however, present in the specimens which he forwarded. In addition to the measure suggested above, of removing the earth from beneath infested bushes, it is claimed that much good has been done by allowing poultry to run in a plantation where the Currant Maggot is known to be infesting fruit. The birds scratch beneath the bushes and destroy large numbers of the puparia. It is probable that the eggs are laid by the female flies when the currants are quite small, as freshly emerged flies were sent to me from Vancouver Island under the date May 20.

FOREST AND SHADE TREES.

No extensive injury to forest or shade trees by insects has come under my notice during 1905, but there have been local outbreaks of some importance. In Alberta the Forest Tent Caterpillar has again stripped aspen poplars, and mention has been made of its work on maples and in orchards in Nova Scotia. There are also indications that Tent Caterpillars are again on the increase in Ontario and Quebec. The Larch Sawfly (*Nematus erichsonii,* Hartig), which appeared in a few places last year upon the native tamaracks and imported European larches, was this year much more abundant, and for some hundreds of miles along the Canadian Pacific Railway between Ottawa and Lake Superior had stripped the young tamaracks growing in the swamps along the railway. Occasional mention was also made by correspondents of the work of this insect in the Maritime Provinces. An insect which has not previously been recorded as doing harm in Canada, the Larch Case-bearer, has this year been found in considerable numbers at Ottawa on the European larch. The Negundo Plant-louse which has occasionally been so numerous upon the cultivated and wild Ash-leaved Maples in Manitoba and the North-west Territories, was again extremely abundant in some places this year. The Cottony Maple Scale (*Pulvinaria innumerabilis,* Rathvon), which for several years has been abundant on the shade trees in some of the cities of western Ontario, was during 1905 even more so than in previous years. The outbreaks of the White-marked Tussock-moth, which in previous reports have been referred to in some Ontario cities, and in Montreal, have attracted much public attention, and at last efforts are being put forth by the municipal authorities in various cities to control these destroyers of the public shade trees. In Vancouver Island, the oak-looper *Therina somniaria,* Hulst, which was complained of as being abundant last year, during 1905 swarmed in countless numbers over the oak trees in the vicinity of Victoria, B.C., and stripped them of their leaves. The Spruce Gall-louse was exceptionally abundant in 1905, and requests for information as to its life habits and the possibility of its becoming a destructive enemy of Canadian spruces, came in from many correspondents in all parts of the country. The ornamental cedars on the Central Experimental Farm were very much disfigured by the mining larvæ of a very small moth belonging to the genus *Argyresthia.* The moths appeared at the end of June and were found flying in clouds around all varieties of the American Arbor-vitæ, or so-called White Cedar. The full life history and the exact identity of the species are not yet worked out; but young larvæ were found in the twigs early in spring, the moths emerged in the latter half of June, and the young larvæ are at present in enormous numbers passing the winter inside the small twigs. As yet, no parasites have been bred. What was apparently this same species, was sent to me in 1899 by Mr. Thos. Ware, from Plattsville, Ont., Writing of this occurrence, Mr. Ware says: 'The insects did my cedars considerable damage in 1899; and not only mine, but whole cedar swamps lost their green and looked quite brown. The trees have since been slightly affected each year, but not to any great extent. I saw a few of the insects this summer but the hedge has not suffered.' The injury to ornamental shrubs, and there are many varieties of the white cedar grown as such, has certainly been serious this year at Ottawa. So far, no remedies have been tried. The Fir Sawfly, *Lophyrus abietis*, Harr., appeared upon cultivated White Spruces in two or three places in Manitoba. Mr. T. C. Court sent specimens from Petrel, Manitoba, and their work was noticed upon cultivated spruces around the government offices in Winnipeg as well as in the sand hills south of Douglas, Man. This insect occurs in troublesome numbers from time to time in Manitoba, but is easily controlled by poisonous sprays if promptly applied as soon as the larvæ are noticed. A very similar larva, but probably of another species of sawfly, was sent to me by Mr. H. H. Miller, M.P., from Hanover, Ont., where it had been found in destructive numbers upon a cedar (arbor-vitæ) hedge which was much valued by its owner.

THE SPRUCE GALL-LOUSE (*Chermes abietis,* L.).—An insect which is spreading widely through the Dominion and which of late years has been the cause of much anxiety among the growers of ornamental spruces and even of lumbermen, is the Spruce Gall-louse. This is the insect which causes the elongated green cone-like galls on the twigs of the native Black and White Spruces and of the imported Norway Spruce. These galls have been more than usually abundant during the summer of 1905, particularly upon young transplanted trees. Specimens have been sent in from many places.

Although undoubtedly the Spruce Gall-louse does injure trees to a serious extent when present in large numbers and also gives them a very unhealthy and unsightly appearance, still I do not know of any actual instances where it has killed trees outright.

About the end of July the galls begin to dry up, and the cavities at the base of the leaves open slightly and allow the young gall-lice, of which there are several in each cavity, to escape. These then crawl out and rest upon the leaves, and after a short time they moult and appear with wings. This is the time when the insect spreads from tree to tree; for these mature females fly to fresh trees or to fresh branches on the same tree and begin to lay small, pale yellow eggs, which are in clusters of from 20 to 50 together. From these eggs young plant-lice hatch, which remain on the twigs and at the base of shoot buds until the following spring. Many of these young lice, however, die before spring, and those which do survive the winter, may be found at the bases of the buds in May, enveloped in a coat of white waxy threads. These young plant-lice are very small when winter sets in; but in spring they grow rapidly, and, after moulting the old winter coat, they secrete another of much finer texture and much more conspicuous, of long woolly threads. When full grown these insects, which are all females, lay clusters of upwards of 300 eggs at the bases of the young shoots just about the time the spruces are beginning their new spring growth. The eggs are light yellow in colour, extremely small, about one-sixtieth of an inch in length, and each one is attached by a slender thread-like stem about twice the length of the egg. In about a week the very minute nymphs crawl out from beneath the woolly mass consisting of the dead body of their mother, and crawl on to the young shoots, where they take up their position at the bases of the leaves which have already begun to swell and form galls before their arrival, owing to the presence of their mothers during the winter. The green cone-like gall grows rapidly during June; the base of each leaf swelling and expanding so as to form a cavity which gradually develops and covers in some of the young insects. In time this cavity is closed all but a narrow semi-circular slit at the top. It is claimed by Prof. R. A. Cooley, who did very careful work on this insect while at the Massachusetts Agricultural College, that, in general, all of the nymphs which enter one gall, arise from the egg cluster laid by one female. As the gall grows in size, these cavities are enlarged, this leaves room for the increased growth of the insects which it contains.

As stated above, these insects do not become full grown and emerge from the galls until the end of July or during August. The remedies for the Spruce Gall-louse, unfortunately, cannot be applied when the insects occur on very large trees and in forests; but, upon hedges and in ornamental grounds good work has been done by spraying the trees at the time the young plant-lice are exposed on the trees, viz., in May, and after they emerge from the galls in August. Good results were secured by spraying with a tobacco and soap wash made by soaking ten pounds of tobacco leaves in 3 or 4 gallons of hot water for six hours, the liquid strained off and two pounds of whale-oil soap added. When the soap is all dissolved, the mixture can be diluted to 40 gallons. Two or three applications should be made at short intervals.

THE LARCH SAWFLY (*Nematus erichsonii,* Hartig).—About 20 years ago the Larch Sawfly was imported into America, probably with trees sent to the Harvard Arboretum and Botanic Garden at Cambridge, Massachusetts. From that point it seems to have spread widely and very rapidly northward. In 1882 it reached Canada, and for three or four years after that did an enormous amount of injury by stripping the leaves from the tamaracks, or American larches. The attack was very severe, and, although from the injury being done comparatively early in the season, the trees were able to push forth a certain amount of foliage; after three or four years of being stripped, the larches over millions of acres, and practically over the whole of eastern Canada, were almost wiped out. With this large destruction of its food plant the insect practically disappeared, and little has been heard of it until last year, when it again became noticeable upon ornamental European larches and in a few places was observed on the young growth of larches in swamps. During the past summer there has been a marked increase in the numbers of the larvæ or false caterpillars. The injury is mentioned incidentally in correspondence from many points. Rev. Father Burke writes from Prince Edward Island:—'I am sorry to say the Larch worm is again appearing on the new growth, and I fear we may have it much more abundantly next year.' In the Nova Scotia Crop Report for November, 1905, a correspondent writing from Richmond county says:—'Insects have again been destroying juniper trees.' This is a reference to the Larch Sawfly. The American larch, known also extensively in this country under its Indian name of the *tamarack*, is called in the Maritime Provinces by the inaccurate name of 'juniper,' a name which is also curiously, and with equal inaccuracy, given in the upper Ottawa country to the Banksian or Jack Pine. In New Brunswick I saw evidences of the work of the Larch Sawfly at several places along the Intercolonial Railway and in Ontario for hundreds of miles along the Canadian Pacific Railway between Ottawa and Lake Superior. The larches at Nepigon, Ont., north of the lake, showed no injury, and I am under the impression that so far this new outbreak of the Larch Sawfly has not as yet reached west of Lake Superior. The tamarack swamps west of Nepigon were scanned carefully in passing along the railway, and a large swamp was examined more critically near Douglas, Manitoba, but no trace of the larvæ was seen. Specimens of the larvæ were sent from Burlington, Ont., by Mr. R. C. Cummins at the end of June.

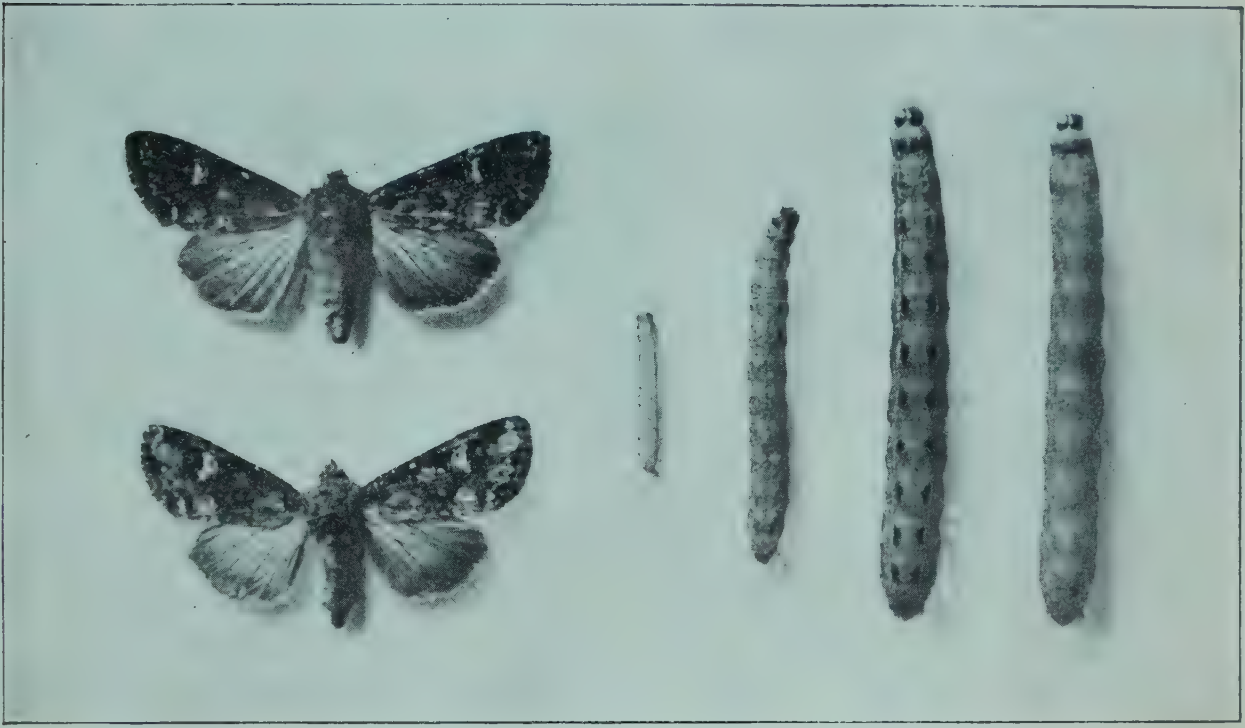
A feature of the last outbreak of 1882 to 1885 was the rapidity with which the attack spread and the suddenness with which it disappeared. Occasional specimens of the sawfly or of the colonies of larvæ have been seen from time to time since 1885; but there has been no noticeable destruction until the present year. The territory over which this insect is known to have spread in the old outbreak, is all through Ontario, Quebec and the Maritime Provinces, right up to Labrador (*teste* Dr. Robert Bell and Mr. A. P. Low). We have no information relating to the vast tamarack swamps north of Saskatchewan and Alberta; but there is little doubt that this enemy spread through all districts where the American larch grew naturally, and that the depredations of this one insect resulted in an enormous loss to the Dominion in one of its valuable assets. Unfortunately, no remedy can be applied over the vast areas of forest where the insect is likely to occur, should it increase again; but upon ornamental grounds small groups of trees can be easily protected by the ordinary spraying methods. The best poison probably for this insect would be a spray of Arsenate of lead 1 lb. in 40 gallons of water.

THE LARCH CASE-BEARER (*Coleophora laricella*, Hbn.).—In the month of May last the young leaves of the European and other larch trees on the lawns and in the Botanic Garden of the Central Experimental Farm, were seen to present a bleached white appearance; and, upon examination, it was found that the upper ends of the leaves had been hollowed out and were shrivelled. It was then found that this work had been done by large numbers of the small European Elachistid moth *Coleophora laricella*, Hbn. Although this insect has been recorded as injurious to larches in America on a few previous occasions, this, I believe, is the first occurrence of the Larch Case-bearer in Canada. Dr. Howard has kindly referred me to the American literature of the subject and tells me that he himself saw the larvæ very abundant some years ago in a larch plantation near North Andover, Mass. In 1886 Dr. H. A. Hagen published in the *Canadian Entomologist,* an article on its injuries to the European larch in Massachusetts. In 1892 Mr. J. G. Jack, as related in Insect Life, vol. IV., p. 105, states that the insect had been introduced into Massachusetts for a number of years, and that its ravages had sometimes been quite noticeable in the Arnold Arboretum. Mr. Jack wrote from Berlin in an article entitled 'Notes of a Summer Journey in Europe,' which appeared in *Garden and Forest* for February 24, 1892, p. 87, and says of this insect that 'the European larch is sometimes seriously injured and is often killed by the larvæ of this moth, which eat out all the interior of the leaves, leaving only the dry, hard, shrivelled epidermis.' He also points out that the Japanese larch, both in Germany and at the Arnold Arboretum, is not attacked by the insect.

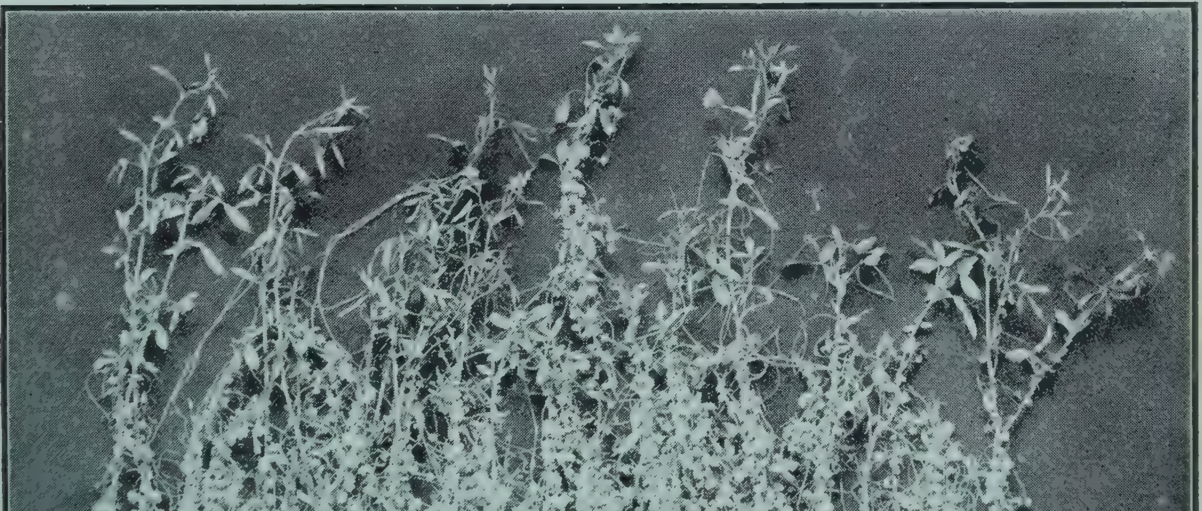
The numbers of the larvæ upon the trees at Ottawa in May last were not large enough to have any serious effects upon either the growth or appearance of the trees; but I regret to find this autumn that the small cases of the larvæ are enormously more abundant than they were last spring. The winter cases are very slender and vary from 2½ to 4 millimetres in length by about half a millimetre in diameter. They are open at the end and are almost cylindrical in shape, like a cut off leaf. For that reason they are easily overlooked. There were among these larval cases a very small percentage which were curved after the manner of the winter cases of the Cigar Case-bearer of the Apple; but it is possible that these may have been the cases of another species. The cases of the full-grown larvæ of the Larch Case-bearer are after the same pattern as the winter cases, but are thicker and resemble more nearly those of the Cigar Case-bearer by being tapered slightly to each end. They are very little longer than the winter cases but have a much larger diameter, being over one millimetre at the widest part; and the end is somewhat pinched in. The colour is pale drab. The caterpillars have a curious habit, when full grown, of fastening themselves in the centre of a fascicle of leaves, where they are very difficult to detect. There is only one brood in the year, the moths of which appear in June. They are very small, not expanding more than one third of an inch when the wings are opened, of an ashy satiny gray colour, with long, slender antennæ. After pairing, the females lay their tiny yellow eggs on the needles of the larch. These soon hatch, and the larvæ eat their way into the slender needles of the empty skins of which, subsequently, they make the slender cases in which they pass the winter, attached to the twigs of the trees. As soon as the buds begin to swell in spring, these minute caterpillars revive and feed upon the young leaves. When a caterpillar attacks a leaf, it eats a hole in the side, and, as it consumes the interior portion, it protrudes its body from the case until it can reach no further without leaving the case. In spring the young caterpillar grows rapidly, and its winter case soon becomes too small for it; so, it is split down the side, and the empty skin of another leaf is inserted. This operation is repeated from time to time when necessary, until full growth is reached. Some cases from successive additions have a ridged or striated appearance. Pupation takes place inside the case, and the moths emerge from the upper end. Up to the present time nothing in the shape of a practical remedy is recorded.

Through the kindness of Mr. A. Scheck, of the German Consulate, in Montreal, I have received the following interesting account of the habits of this insect, in Germany, from Mr. Rudolph Japing, Forest Assessor, Muenden, Hanover, Germany:

'The moths of *Coleophora laricella,* Hbn., fly during the day time in May and June. The females lay yellow eggs on the needles, which in 6-8 days turn to a grayish colour. Upon hatching the young caterpillar eats its way into a needle, consumes the interior, and from the empty skin makes a small bag in which it lives until September. During winter the caterpillar remains in this bag, generally on the top of the branches, more seldom in crevices of the bark. In spring it is again found mining in the new needles, and soon has to enlarge its bag, which it does by joining to it a part of a newly hollowed out needle. In this bag the insect changes to a chrysalis in April and May, the moth emerging at the end of May.



THE SPINED RUSTIC *(Barathra occidentata,* Grt.*)*
Moths (the lower, typical), and caterpillars, young, half grown and full grown.



CLOVER DODDER ON ALFALFA.
(Figure kindly lent by "Farmers' Advocate," London, Ont.)

'The injury to the trees from these insects can be very great, especially in spring. The growth stops and the trees become feeble and are thus susceptible to canker, which often follows the damage done by the insect. The Larch Case-bearer is mostly found on trees from 10 to 40 years old.

'In nature the insects are devoured by many birds, and in autumn they are often destroyed by protracted rains and by early frosts.

'Trees badly infested by these insects should be cut down from the middle of June till the end of August. This causes the leaves to dry up and the caterpillars die of starvation. It would be better to burn the needles, but this is possible only in nurseries. In the extensive forests of Canada it would be difficult to do anything effective to destroy the insects.'

THE WHITE-MARKED TUSSOCK-MOTH (*Hemerocampa leucostigma,* S. & A.).—Of recent years the shade trees in several of our Canadian cities have been very much disfigured by the caterpillars of this well known native insect. Energetic measures have been taken by the local newspapers and the civic authorities, particularly in Toronto and Montreal, to reduce this quite unnecessary injury to the fine shade trees in these beautiful cities. Public meetings have been called, and the advice of specialists has been taken. There is nothing of any importance which is still unknown of the habits of this insect, and all that is now necessary is the prosecution of a vigorous campaign at once, so as to control as soon as possible, if not actually to wipe out, this unwelcome guest which has done so much harm. The subject was treated of at some length at a public lecture which I had the honour of delivering before Toronto University in February last, and again before the Toronto Horticultural Society in June. The discussions were reported at length with further comments by the Toronto *Globe* and other newspapers. A similar action was taken in the city of Montreal where a conference was summoned by the Montreal Natural History Society, and a thorough discussion of the subject took place. The *Montreal Star, La Presse,* and other newspapers, published several articles in their daily editions, and at request I prepared a full article for the *Weekly Star and Family Herald.* The course of action recommended by me at all of the above meetings was to destroy the caterpillars by spraying the trees while the caterpillars were young, with arsenites or other active poisons, and the collection of the conspicuous egg masses during winter. Prof. D. P. Penhallow, of McGill University, has taken an active and useful part in distributing information on the subject, and in drawing the attention of the public of Montreal to this important matter, and his efforts have been ably supplemented by Mr. H. H. Lyman, who has materially assisted with expert advice as to the correct natural history of the insect. It is to be hoped now that public attention has been drawn to this matter, vigorous measures will be adopted, and that private citizens will second the efforts of the municipal authorities by attending to their own trees and gardens, which cannot be well reached by officials. In this way this insect may be very much controlled. Its possibilities for injury are only too well known by what it has done in New York, Rochester, Cleveland and other cities in the United States.

THE VANCOUVER ISLAND OAK-LOOPER (*Therina somniaria,* Hulst).—The beautiful oak trees which form such an attractive feature of Victoria, Vancouver Island, have again this year suffered severely from the attacks of the caterpillars of this geometrid moth. It was hoped from the large numbers of parasites which were reared from the pupae last autumn, that the injury during 1905 would have been less than in the preceding season. These hopes, however, were doomed to disappointment, for the caterpillars occurred last spring in countless myriads and stripped every vestige of foliage from most of the oaks around the city and for several miles out into the country. Mr. J. R. Anderson wrote under date June 23:—

'*Therina somniaria* is already at its deadly work worse than ever. The oaks in some places are already stripped of their leaves, and other plants are being attacked by the famished larvæ, which are as yet only half grown. What is to be done, I do not know, unless the parasites increase. Treatment of the trees with poisons over miles of country is of course out of the question.'

There is some doubt among entomologists as to the exact status of *T. somniaria* as a species. It has usually been considered that it is a form of *Therina fervidaria,* Hbn., but the difference in the food plant, *fervidaria* having been found in nature, here at Ottawa and in other places, feeding on conifers, seemed to indicate, more perhaps than the slight differences in markings on the mature insects, that the western form would probably prove to be a different species. Having received eggs from Mr. Anderson early in the spring, as soon as the young larvæ hatched, they were placed upon fresh twigs of the hemlock spruce (*Tsuga Canadensis*), and, although it cannot be said that at any time they fed upon the hemlock with avidity, nevertheless some specimens were carried through upon this food plant alone and gave moths at the usual time. Moreover, on Vancouver Island, when travelling with the Rev. G. W. Taylor, in September last, a few miles out of Victoria, we observed one instance where the larvæ, after having stripped the oak trees, had spread for a short distance into a grove of Western Hemlock Spruce and Douglas Fir, the leaves of which to some extent had been eaten by them. Mr. Taylor, who is a specialist upon the Geometridæ considers it more probable that *Therina* (Ellopia) *somniaria* of Hulst is a variety of *Therina fiscellaria* of Guenee, which is a segregate from the old composite species *Therina fervidaria* of Hubner, than that it is identical with the type species *T. fervidaria,* Hbn. He says:—'It may be said that *T. fiscellaria* and *T. somniaria* feed as larvæ on deciduous trees, while true *T. fervidaria* feeds on conifers.' It would appear from experiments which I have carried on at Ottawa, that this generalization is accurate, and, although eggs of *somniaria* from Vancouver Island gave larvæ which under compulsion fed on hemlock spruce, a conifer, others from the same batch of eggs ate oak, their natural food plant, much more readily. *T. fervidaria* at Ottawa feeds naturally on hemlock spruce.

From pupæ received from Mr. J. R. Anderson, which had been collected at Victoria, several specimens of *Pimpla scriptifrons*, Cress., were reared, thus adding one more species to the many parasites which are already known to prey upon this insect. I saw the mature moths and the parasites emerging in enormous numbers in Victoria on September 18 last. Trees, fences, and sides of houses were swarming with the pretty soft brown, large-winged moths.

THE APIARY.

The Apiary, as in the past, has been under the management of Mr. John Fixter, the farm foreman, whose report I append herewith. The same experiments which have been carried on for some years have most of them been repeated on account of the large amount of interest which has been evinced in the subject by correspondents and visitors to the Central Experimental Farm. The services of Mr. Fixter have been asked for at a great many meetings of bee-keepers, and, whenever his duties at the Central Experimental Farm would permit of it, he has attended these metings and given addresses.

REPORT OF MR. JOHN FIXTER.

SEASON OF 1905.

The season of 1905 has been a fairly good one; especially in western Ontario the honey crop has been excellent, both as to quality and quantity; parts of Quebec report medium crops, while other sections report heavy crops. Correspondents from New Brunswick, Nova Scotia, Prince Edward Island, Manitoba, the North-west Territories, also British Columbia, report medium to heavy crops and that bee-keeping is on the increase in each of those provinces.

The season opened very late in the Ottawa valley, there being so much cold wind at the end of March and up to April 11. It was necessary to keep the bees in their winter quarters until this latter date when the colonies were placed on their summer stands after being confined in their winter quarters for 139 days. The temperature, 52 degrees, and the weather bright and mild on April 11 were most favourable for the cleansing flight of the bees. Then followed many days of cool and windy weather, which kept the bees confined to their hives; this continued the greater part of April, the average temperature for April being 41·14. May set in warmer, the bees gathered pollen freely, and built up fairly well. During the long cold spell in April it was found necessary to feed the bees to keep up brood rearing and to prevent spring dwindling.

The number of colonies on November 23, 1904, was 50, all of which came safely through the winter. Of these two were sent to the Experimental Farm at Nappan, N.S. Eight colonies being rather weak were doubled with others, leaving 40 strong colonies to begin the season of 1905. These were again increased by swarming to 50 colonies, when the hives were put into their winter quarters on November 7, 1905. They all weighed then over 50 pounds each. The honey crop at the Experimental Farm Apiary has been a fairly good one, the average yield being 73 pounds per colony, spring count.

EXPERIMENTS ON HOW TO PREVENT SWARMING.

I.—*H. G. Sibbald's Plan.*—For this test six colonies of bees in eight-framed Langstroth hives were selected weighing on an average 48½ pounds each. All were examined from time to time for swarming. On June 10 there was no sign of swarming. At that date each colony had abundance of brood and a considerable amount of new honey. On June 15 they were again examined. Three colonies were found preparing to swarm. Those three colonies were set off their old stands on other stands a little to one side. New hives were placed on the old stands thus left vacant. Each one of these contained two empty combs and five empty frames with two inch starters of foundations. Next, one frame of brood with queen-cells on it, was taken from each one of the old colonies that had been set to one side, making sure that we did not get the queen, and placed with the adhering bees in the hive between the two empty combs. The extracting super that had previously been removed from the old colony, was placed on the new hives with all the bees it contained. On June 19 a second examination was made. One more colony was preparing to swarm; this one was treated the same as the former three. The old colonies that had been manipulated, were examined, and all queen-cells were found to be destroyed. The old colonies were then placed on their original stands, removing the one frame of brood from the new hive, destroying all queen-cells on it and placing it in the old colony. Any bees that remained on the starters were transferred to the old colony. The extracting super that was taken off the new hive was again placed on the old colony along with the bees it contained, making one very strong colony. The fourth colony that was found preparing to swarm, was treated after four days in the same manner as the three former colonies. The other two colonies did not swarm during the season. At the close of the season we had six very strong colonies, with plenty of stores for winter and 468 pounds of extracted honey.

II.—*Forced or Shaken Swarms.*—For this test six colonies of bees in 8-framed Langstroth hives were selected, weighing 49¾ pounds each. Examined on June 10 they showed no sign of swarming; there was abundance of brood and considerable new honey. June 15 a second examination was made; four colonies were preparing to swarm. The two remaining colonies did not swarm during the season.

Six other hives are previously prepared for swarms, each containing, in the order named from left to right: four dummies, one starter, one worker comb and two starters. One of these hives is brought and set on a stand directly behind one of the hives to be treated. The operator removes the first two dummies (Nos. 1 and 2) from the left or nearer side of the new hive, and puts them on one side. He then lifts from the brood chamber of the old hive the comb nearest to him, shakes it almost free of bees, and places it in the new hive next the left wall. The next comb in the old hive has a double space for shaking off. After being shaken it is placed beside the first, and the return motion of the hand carries the dummy (No. 3) from the new hive to the old one. Comb No. 3 is shaken, carried to the new hive, and dummy No. 4 is brought back. The fourth comb changes place with the first starter, and so on. When the eighth comb has been shaken in its own hive and transferred to the new, the brood chamber of the old hive is filled up with the remaining two dummies, Nos. 1 and 2. We then put supers on again, close the hive and the bees have been swarmed.

On the seventh day after shaking, the four old colonies were removed to another location. Most of the bees that were flying went with the shaken swarm, leaving the old colony so weak that it did not have any inclination to swarm, and only made sufficient honey to carry it over winter.

At the close of the season we had from this test 10 colonies and 432 pounds of extracted honey.

EXPERIMENTS IN IMPROVING STOCKS OF BEES.

Every farmer knows that there are great differences in his cows, hens, &c., but there is too often an idea that all bees are alike, and that bee-keeping is all a matter of luck. If you observe closely, you will find that one colony of bees may give you good returns, while another just beside it, does nothing in the surplus chamber. Bees are by no means all alike. They differ in disposition, temper, industry, and in other ways. It is worth while for you to have the best. Fortunately the change from poor to good stock may be made more rapidly than with other stock, and at less expense. By paying out a dollar or two for a queen, you may change a colony of poorest black bees to Italians. All you need to do is to send off your order to a reliable queen-breeder, such as advertise in our bee journals and agricultural papers, and the queen will come by mail, with directions for introducing it, which are easily followed. As a worker bee only lives about six weeks in the honey season, and, as the new queen will be laying from one to three thousand eggs in a day, you will see that, if you get an Italian queen into a colony, it will not be a great while until all the bees in the hive are Italian. Even if you do not change from one kind of bees to another, it is generally a matter of advantage to introduce fresh blood occasionally. In any case, whether you get fresh stock from outside or not, whether your bees are Italians or hybrids, there is always something to be done in the way of improving your stock, so long as any one of your colonies is better than the others.

How are you to know which are your best colonies? By keeping track of their performance, and putting it down in black and white. You can keep account of the amount of surplus honey you take from each colony, and set it down at the time. The next year you can select the best colony for your queen-breeder, and a certain number of the next best colonies for drone rearing. One thing, however, must be taken into consideration, and that is, whether there has been no change of queens in any of these colonies. The colony that gave you the largest amount of surplus last year, may have got a new queen last fall or this spring; the young queen may also have met a drone of poor stock, and from this you do not wish to breed. You can, therefore, count only on those colonies that have made a good record and still have the same queen with which they began the season last year. You must also take into account any special advantages or disadvantages. For instance, if from colony No. 1 you took two frames of brood in the spring to give to No. 2, and you then found that No. 2 stored just a little more surplus than No. 1, it would not be fair to rate No. 2 as better than No. 1. The matter of swarming also comes in. A colony that has cast no swarm throughout the season, will be expected to store more surplus than either the swarm or the mother colony, generally it will store more than both together. Nearly always, however, it will be found that the bees that do the most work, are the least given to swarming; so, the swarming of a colony counts against it in making out its character.

In the ordinary course of management, where bees are left to their own way, and all the increase is through natural swarming, there will, of course, be the most increase from the colonies most given to swarming, which means that the general character of the Apiary will run toward swarming rather than storing. We want, however, to have the tendency not to swarm. There is a way in which a good deal can be done in the way of improvement, even by those most skilled in the management of bees:

Having decided which one, or two, or three, are the best colonies you have, watch for the first one that swarms. Suppose Nos. 1, 2 and 3 are your best, that No. 4 is the next strongest, and the rest follow in the order of their strength, 5, 6, &c. Suppose No. 2 swarms; hive the swarm and put it on the stand of No. 2. At the same time, put the old No. 2 in place of No. 4, and put No. 4 in a new place. All the field bees that were in No. 2 will join the swarm, making it good for work. The old No. 2 (now No. 4) will thus be deprived of its field bees, but on the other hand it will get all the field bees that belonged to old No. 4. In about eight days No. 2 will have a young queen matured, and will send out a swarm. You will now proceed much as you did before. Hive the swarm and put it in the place of No. 2, and put No. 2 in place of No. 5, putting No. 5 in a new place. The field bees of old No. 5 will strengthen No. 2, now on No. 5 stand, and in a day or two it will send out another swarm. Proceed as before, putting No. 2 in place of No. 6, and so on as long as swarms issue. In this way you have, perhaps, no swarms from old Nos. 4, 5, &c., but in their place you have swarms from No. 2, all of them having queens of your best stock. When No. 1 swarms, or No. 3, you can treat them the same way.

There is, of course, the possibility that No. 1 or 2 may not be among the first to swarm. Take frames of sealed brood from colonies that you do not want to swarm, and give them to one of your best colonies, while delaying the swarming of those from which the brood was taken. Of course, when you take these frames of sealed brood, you will merely exchange them for frames that have little or no sealed brood in them.

QUEEN REARING.

Rearing queens has become a regular trade, and some bee-keepers make a business of shipping queens by mail to those who wish to purchase. Although it may not be desirable for the farmer with only a few colonies to go into the subject fully, he should know enough about it to rear the queens at times, for his own accommodation.

When a colony prepares for swarming, a number of queen-cells are started, six, eight, ten, possibly many more. As soon as the first one of these is sealed, the colony is likely to throw off a prime swarm. Six or seven days after this swarm has issued, the mother colony may divide up into two or more parts, each part being called a nucleus, the word 'nucleus' merely meaning a very small colony. You will generally have enough queen-cells in each nucleus without any attention on your part, but not always. Sometimes you will find a large number of queen cells on one comb, and some combs without any. So, it might happen that if you give the matter no attention you might have a nucleus without any queen cell.

Another thing must be considered. A large proportion of the queen cells are built on the lower or outer edges of the combs. If these were left in the old colony without dividing, they might be all right; but when these combs are used as nuclei, it is harder for the smaller number of bees to keep them warm, and when a cool night comes, the bees will shrink away from the edges of the combs, and the queen cells will be chilled. Hence, you must see that each nucleus has at least two or three good queen cells where they will be sure to be inside of the cluster of bees in the coolest nights. So you will cut away cells from the edges of the combs and from combs that have them to spare, and fasten them where required. To cut out the cells, you may use a pocket knife with a very sharp, thin blade that is more than an inch long. You need not cut away more than enough to get all the cell; but be very careful not to cut into the cell; also not to let one of the cells fall, for while the young and tender queen is in the cell, a fall may cause a defective wing or leg.

To fasten a queen-cell where you want it, use a very slender wire nail an inch and a half long. Push the nail through the base of the cell, but be sure it does not enter the cavity of the cell. Nail the cell right over some of the brood, for it will be more surely taken care of there than if separate from the brood.

It may be noticed that the bees build queen-cells with the points hanging downward, but it is not important that you should have them in exactly the same position. A still better plan than a nail to fasten a cell, is a staple, the staple being an inch and a half wide with points one inch long. Lay the cell against the comb, put the staple over it so that the cell is at one side of the staple, and then sink into the comb the staple point that is farthest from the cell. Possibly you may be inclined to think that because only one queen is to be reared in a nucleus, there is no need to have more than one queen-cell. That would be a mistake. While most of the cells reared by a colony preparing to swarm may be of the very best that colony can rear, it is not safe to assume that all are equally good. Some cells may contain poor queens, and some cells may contain nothing but a dead larva. So it is wise to have a number of cells in a nucleus, at least two or three. The bees will be likely to use the best. You will be able to see a difference in the appearance of the cells, and while you are dividing the cells among the nuclei, you may as well see that each nucleus has its fair share of the best-looking cells. The best cells are generally among the largest and longest, and are deeply pitted over the surface. A stubby cell that is not pitted but has a smooth surface, is not likely to be good. When the young queen is five to eight days old, she will fly out on her wedding trip, and about three days later she will begin laying. It may be well not to look for eggs till the queen is perhaps two weeks old, for at first the eggs are few, and not easily found. If you do not find eggs when the queen is two weeks old, you are not likely to find any later—the queen has been lost on her wedding trip or there is some other trouble. It is a good plan to give a nucleus a frame of eggs or unsealed brood from a choice colony when the young queen is four or five days old. If some ill has befallen the queen on her wedding trip, or if she has entered the wrong hive, the bees will start queen-cells from this young brood. This young brood seems also to have a sort of stimulating effect on the bees, and it is believed it may hurry up the young queen in her work of laying.

CARE OF EMPTY COMBS.—REMEDY FOR BEE MOTH.

Almost any bee-keeper will have honey-combs that are for a time unoccupied by bees; even if through no other cause, colonies may have died in winter, leaving combs empty or containing honey or pollen. Such combs are valuable property and will repay the care required to preserve them. The three principal enemies of unoccupied combs are mould, mice and moths.

Combs kept in a damp, close cellar are likely to be affected by mould. This cannot be entirely prevented where bees are wintered in the cellar; for, even if no colonies die, it may happen that some of the outer combs unoccupied by bees will be covered with mould. Fortunately, the remedy is not difficult. Put a mouldy comb next the brood-nest of a prosperous colony in the working season, and you will be surprised to find how soon the bees will clean it up so that you will hardly recognize it as the same comb.

Mice must be kept away from combs by shutting these up in hives or in such other place where the mice cannot enter. But be careful that you do not pen the mice in with the combs.

The chief enemy of the apiarist is the Wax Moth. If a colony dies in the spring and the hive remains unnoticed on its summer stand, it is almost certain that, before the summer is over, you will find it containing a solid mass of webs and cocoons, with perhaps not a vestige of comb left. You may have sealed up the hive moth-tight before it is warm enough for a moth to fly; the result will be the same; for the eggs of the moth by some means have been laid, during the previous fall, in the hive, notwithstanding the presence of the bees. It is, however, not an easy thing to make a hive moth-tight, for a moth will squeeze through a much smaller crack than a bee. The right thing to do with a hive full of combs upon which a colony has died, is to get the combs as soon as possible in the care of a strong colony of bees. Especially if of Italian blood, the bees will make short work of cleaning out the worms before they are large enough to do much harm.

There will be little danger to the combs from the moth until the weather has become warm and bees have been flying for some time, say about the time of apple bloom. When a hive is noticed with unoccupied combs, clean out all dead bees, and put it under a hive occupied by a strong colony. If there should be any entrance directly from outside into the upper hive, close it up, so as to oblige the bees to pass through the lower hive in going in and out. Keep the entrance very small the first few days, for fear of robbers. After the colony has had this lower hive in charge for about a week, so as to get it cleaned out and get used to the work, you can give it a second hive of combs to clean out, putting the second in the place of the first.

If colonies have died in hives in the cellar, there will not be the same need of haste as to getting them in care of the bees. Indeed, it may not be a bad plan to take into the cellar hives whose bees have died on the summer stand; for in the cellar the worms will hardly get a fair start until the next spring, when the unoccupied combs will be needed to form swarms. It is well, however, to look at them occasionally to see that they are all right, for it is not difficult to see where the worms have run their silken galleries. The question is often asked whether it will do to hive a swarm in a hive in which a colony has died. Unless such a hive is exceedingly filthy, the bees will promptly clean it up, at the same time being saved much labour in building new combs.

It is well to know that freezing destroys the worms. So a hive of combs that has been left out all winter, is in no danger of worms until well along in warm weather, when moths have had time to mature and to lay eggs. If such combs are hung up in an airy place with a space of an inch between them, they will almost surely be safe from worms throughout the summer, and indeed worms may not trouble them all summer if left in the hive in their usual position.

If for any reason it is desired to kill worms in combs, sulphur is the material usually resorted to. A very little of the fumes of burning sulphur will finish the worms when they are quite small; but, when full grown, it takes a very heavy dose; so it is well first to pick out the larger ones by hand. For this take a sharp pointed knife and pick open the comb at one end of the silken gallery for half an inch, then commence at the other end and tear it open the whole length. This will drive the worm along till it comes out of the hole you first made. You can end its existence by what means may seem best. To fumigate a hive with sulphur, set into a pan or kettle partly full of ashes a smaller vessel of *iron*. In this put the sulphur and throw on it a shovelful of live coals or a red hot iron. This must be in an empty hive or some tightly closed box or chamber so that the fumes cannot escape. Great care must be exercised so that the fire does not extend to the surrounding wood. The combs placed over the burning sulphur may be prevented from catching fire by means of a piece of old sheet-iron placed under them. It must be further remembered that burning sulphur destroys only the worms, not the eggs. So, it may be necessary to treat the combs a week or two later, when any eggs laid will have hatched. Combs of honey for table use are not likely to be infested with worms; but in the case of black bees, especially if the combs are left too long in the hives, there might be some worms. The dose of sulphur for these may be lighter than for brood combs; if the dose is too heavy, the white combs will assume a greenish colour, which, however, does not hurt them for eating.

When extracting combs are extracted for the last time in the season, it is the practice of most bee-keepers to allow the bees to lick them dry. A hive full of such combs may be placed over a colony, a propolis quilt with a small opening through it, having first been placed over the brood frames, and this allowing but one or two bees to pass at one time. Thus, the bees are not so apt to break down the combs and there is less danger of robbing; but a surer way is to set the hive at some distance from the apiary and let the bees have free play at it. After being thoroughly cleaned, all hives containing combs should be removed to a dark room until late in the autumn, and then to a building where they will get the full benefit of frost during the winter.

UNFINISHED SECTIONS.

At the close of the honey harvest there will always be more or less of the sections unfinished, the number varying greatly in different years. It will happen some years when the season is poor, that none will be finished. Even in the best of years there will be a considerable portion left unfinished, varying all the way from those the bees have not started at all, up to those that are filled with honey, but have a few cells unsealed. Those that have not been worked at by the bees, having no honey at all in them, may be put away until the next year, when they can be used. Be very careful, however, that you do not make the mistake of leaving such sections too long on the hives. When the harvest is over, they should come off at once, for the bees will only daub bee-glue upon them, and sometimes to such an extent that the sections will not be accepted by the bees the following year. Some make a practice of taking off all sections at the close of the clover and linden harvest, so as to have none of the dark honey in them and to avoid the bee-glue being put on them while the bees have nothing to do between the early and late harvests. If a fall flow comes, sections can be again put on, or, better, extracting combs.

Sections that are not entirely finished, will, of course, do for the table, and if they are to be sold, they must be sold at a lower price. Any that are less than half filled with honey, should be fed to the bees. If you set out a super of such sections where the bees can get at them, they would promptly carry out the honey, but would be so eager at this work that they would tear down the tender comb so as to ruin it. Extracting combs are not in the same danger unless they are new. To avoid having the sections ruined for future use, cover them up so as to leave a passage for only one bee at a time to get at them. It is better to set them 10 or 12 rods away from the apiary.

These sections, after being cleaned out by the bees will be valuable for use the next year, and one or more of them, if put in each super that is first placed on the hives, will start the bees promptly at work. If the sections were not cleaned out, the particles of honey remaining would candy and affect the new honey put in them the next season.

JOHN FIXTER.

DIVISION OF BOTANY.

CLOVER OR ALFALFA DODDER.

From time to time inquiries are made by farmers concerning curious leafless, thread-like, fleshy parasitic plants which they find climbing over clover and alfalfa in their fields. The latter plant is also known as lucern. The parasite injures the host plants very much. As a rule only a few patches will be found in a field; but occasionally, as in an instance referred to below, the dodder parasite increased to such an extent that the crop of alfalfa was practically ruined. Specimens of the parasites having been procured through the kindness of Mr. H. H. Miller, of Guelph, Ont., upon examination they proved to be the Clover Dodder, which in this country is more generally known under the name of Alfalfa Dodder. Formerly this species was known as *Cuscuta trifolii,* Bab., from the frequency with which it occurred upon clover (*Trifolium*) in Europe, but it seems to be now generally conceded that it is the same species as was described from plants growing parasitically upon the wild thyme, and for which reason it had been named *Cuscuta epithymum.* There are several kinds of dodders growing in North America; but in Canada it is a small genus consisting of only a few species. Of these there are only one or two which cause injury to crops; and by far the larger number of cases reported are by the Clover or Alfalfa Dodder; this is a European species which has doubtless been brought into this country with the seeds of alfalfa or clover. It does not confine itself to the different kinds of clover, or even to plants of that natural order, but has been found upon a great many different kinds of plants. It is an annual coming up from the seed every year, and in the past the injuries from this parasite have been so small that it would appear as if in many seasons the seed did not ripen sufficiently to allow the plant to increase and become very destructive. It must be remembered, however, that very little alfalfa, which is a long-lived perennial, has up to the present time been grown in Canada, and consequently the only chance which the dodder had to establish itself, was upon Red Clover, which is a much shorter-lived plant and, as a rule, at any rate, is ploughed down after the second year's crop has been taken.

The seeds of dodder would hardly be ripe before the first crop of clover was cut, and its only chance for ripening seed and perpetuating itself would be in those pods which formed low enough to be left on the stubble, or such as were ripe before the second crop of clover was cut in the autumn. The fleshy pods seem to take a long time to ripen; and among those I have examined, there were very few which seemed dry enough to withstand the September frosts without injury. This, however, is only conjecture, and doubtless in some places further west than Ottawa seed may have ripened this year as it has in previous years to some extent. That this is the case, is shown by the persistence of the plant for two or even three years in a field after it had first been observed. However, such plants may come from seed sown with the clover, of which the germination was delayed; for Mr. H. H. Miller, in a good article upon this subject which was published in the *Farmer's Advocate* for Nov. 23 last, states that 'the seeds will retain their vitality in the soil for five years or longer under favourable conditions. Tests as to vitality have shown that the half-ripe seed of this species will retain sufficient vitality to germinate almost as readily as the fully ripe seed. In some cases, they germinate more quickly; and, when the seeds have been found in their capsules, the percentage of germination was but little inferior to that of well ripened seed.'

The injury done to clover and alfalfa by the dodder is by actually sucking their elaborated sap from them. When the young seed first germinates, a slender yellow thread is pushed up from the soil, which swings round slowly as it grows, and, as soon as this thread touches a living plant, it twines itself around it and throws out from the surface which touches its host, many rootlets or suckers which grow into the tissues of the host plant and draw from it its sap. The host soon becomes dwarfed and in time dies. The dodder plant, however, in the meantime has thrown out a very much branched tangle of fine stems which have spread to other plants in the neighbourhood, from which it is also drawing its nutriment. As soon as the young dodder plant has attached itself to a suitable host, its connection with the soil dries up and ceases. The flowers of the dodder are not produced until the plant has attained a considerable size, when it may form a thick mat from two to four feet across. The flowers are borne in thick conglomerate clusters along the stems and are sometimes so abundant that they almost hide the yellow or reddish stems. Although the plant belongs to the Convolvulus family, the tiny five-lobed corolla does not very much resemble the well known shape of the flowers of the Morning Glory. The seed pod, however, and the shape of the contained seeds show the relationship. The separate seeds found in clover seed are variable in size, some being about the same size as Red Clover seed, others much smaller. They are obtusely triangular, of a pale greenish or yellowish brown colour, with the surface finely granulated.

It is probable that the large seeds, nearly as large as those of clover are of a different species from those usually found, which I take to be *Cuscuta epithymum*. Mr. G. H. Clark, Seed Commissioner of the Department of Agriculture, tells me that ‘ owing to the shortage in the clover seed crop of last year some of our seed merchants imported a lot of clover seed which had originally come from Chili, but was procured through European merchants. This seed was badly infested with Clover Dodder and Wild Carrot. The supply of lucern seed sold in Canada usually comes from Utah, and generally contains some dodder seed. If properly cleaned, however, lucern can be made practically free from dodder seed.’

Mr. Clark also writes me as follows: ‘ Since discussing the matter of the identity of the different-sized dodder seeds found in clover and alfalfa seed, I have gone more carefully into it and now believe that this recently introduced large dodder seed is *Cuscuta racemosa*, Mart., var. *chiliana*, Eng., of which you will note considerable reference made in the reports of French, German and Swiss botanists as a species of dodder found in clover seed imported from South America. We have been able to secure a specimen of seed that was grown by Dr. Stebler, of Zurich, which he classifies as *racemosa*, and which we believe to be almost identical with the dodder imported into Ontario during the past season. We have yet to learn whether this dodder will stand our Canadian winters, but it seems that *C. epithymum* may become a nuisance in the south-western part of the province of Ontario.’

The following is cited from Mr. Miller’s article in the *Farmer’s Advocate* and refers probably to the worst occurrence of the Alfalfa Dodder which has ever been noted in Canada:

‘ As a good example of the injury this weed may accomplish when it once becomes established, let me mention a case in St. Mary’s, Ont., where a fifteen acre field of alfalfa was in two years practically destroyed by this weed. The writer had the opportunity of visiting this field several times during the past summer, and through the courtesy of the owner secured the following information: The field was seeded down in 1902 with alfalfa, oats being used as a nurse crop. Conditions being favourable, it gave a beautiful stand in 1903, being cut twice and giving a total yield of about six tons per acre. The first indication of dodder was noticed June 1, 1903, when the owner found about a dozen small round yellowish patches, which he attributed to the bursting of drainage tiles. In about two weeks, however, these had spread so as to attract special attention, and, upon examination, he found masses of tendrils. In 1904 it had spread so as to produce a blight throughout the field. The alfalfa was cut once and gave a yield of one and a half tons per acre. In 1905 six acres were cut and gave a yield of about one ton of dodder stems and alfalfa per acre. The remainder of the field was not considered worth harvesting, as the dodder had taken entire possession of the crop.'

The question has been raised as to whether alfalfa badly infested with dodder is fit for food for various kinds of stock. Hearing that Mr. T. Murray Bell, of Otterburn Farm, St. Mary's, had some dodder on his alfalfa, which he had fed to sheep, I asked him to let me know the particulars, which are given in the following letter:—

'St. Mary's, Aug. 13.—I have your favour of the 8th, and as requested I send you three samples of alfalfa with and without the parasite. You ask if this crop is grown for seed here, or merely for hay. In reply, as far as I know, it is merely grown for hay and is cut twice in the season. Yes, we fed our parasitized clover to our breeding ewes all last winter without any evil results, two-thirds of them having twins and an abundance of milk with little or no other feed. We intend doing the same thing this winter. The above mentioned hay was fully mixed with dodder when housed; and, when all was fed up this spring, there was no dodder to be seen anywhere. I believe that, if a field infested with dodder were depastured with sheep after the hay was taken off, little or no dodder would be left afterwards, provided of course that it had not already seeded itself.'

In August last I had an opportunity of discussing with Mr. Miller the occurrences of dodder at St. Mary's, and he obtained for me some heavily infested samples of alfalfa, and also, from the same field and grown on the same soil and under similar conditions, a sample of normal alfalfa which had not been attacked by dodder. These were submitted to Mr. F. T. Shutt, the Chief Chemist of the Dominion Experimental Farms, who has kindly furnished me with the following report, from which it will be seen that, as far as the chemical food constituents are concerned, the dodder-infested hay is of about equal value with the unattacked hay; but it must not be forgotten that the crop per acre is very much less, and above all, that the plants in an infested field are destroyed. This analysis is of value in showing that, when hay is found to be infested, there is no need to follow the general course and burn it, unless it is only occurring in very small patches through a crop.

ALFALFA AFFECTED WITH DODDER.

We received from Mr. H. H. Miller, O.A.C., Guelph, on August 16, three samples of alfalfa, as follows.—No. 1 free from dodder, No. 2 slightly affected with dodder and No. 3 very badly damaged, indeed, practically destroyed, with dodder. All the samples were in good condition.

At the suggestion of Dr. Fletcher, the Botanist, we submitted to analysis Nos. 1 and 3, with the object of ascertaining how far the feeding value of the alfalfa, as revealed by chemical analysis, might be affected by this parasite. In the following table the composition of the alfalfa is given, the results being presented as calculated both on the fresh and water-free material:—

Analysis.

	No. 1. Unattacked.	No. 3. Very seriously affected.
Fresh material—		
Moisture	73·41	72·24
Protein	4·91	4·77
Fat or oil	·67	·95
Carbo-hydrates	10·76	13·15
Fibre	7·84	6·81
Ash	2·41	2·08
	100·00	100·00

Water-free material—	No. 1. Unattacked.	No. 3. Very seriously affected.
Protein	18·49	17·19
Fat or oil	2·51	3·41
Carbo-hydrates	40·35	47·35
Fibre	29·50	24·55
Ash	9·15	7·50
	100·00	100·00

Presuming that the stage of growth of the alfalfa is practically the same in both cases, a comparison of the data should enable us to learn what effect or influence, if any, the dodder has had upon the host plant—alfalfa.

In respect to the most important nutrient, protein, the unattacked alfalfa is somewhat the richer; but the difference is by no means a marked one. The fat, or rather ether extract, includes a certain amount of chlorophyll, so that the slightly higher percentage in the affected alfalfa can scarcely be construed as indicating any superiority. The percentages of fibre and ash are slightly lower in the dodder-affected alfalfa.

It might scarcely be warrantable to draw any conclusion from so few data as to the physiological effect of the dodder; but I think we may safely infer that no great difference in feeding value exists between the dodder-free and dodder-affected alfalfa.

FRANK T. SHUTT,
Chemist, Dom. Exp. Farms.

Eradication.—The chief safeguard against dodder injuring a crop of clover or alfalfa, is to examine carefully all seed purchased and clean out thoroughly all weed seeds before sowing. The dodder seed, when once known, can easily be recognized by its dull surface and triangular shape. When dodder plants are found to be growing in a field the patches should be cut at once and the ground hoed so that no low-growing plants may ripen seed. Burning small areas by putting straw or coal oil over them is said to be effective, but would be less convenient than hoeing out the infested plants. Where a whole field has been thoroughly infested, it should be put under a short rotation in which clover for hay is omitted for at least two rotations, as it is claimed that the seeds will remain in the soil for five years without decaying; therefore, some of the seeds of the original sowing, particularly if these were rather dry, might be delayed in germinating for that time. As stated above, it is only quite recently that dodder has occurred in Canada in sufficient quantity in crops to do extensive harm; but, with the increasing cultivation of alfalfa, it is of course possible that it may become a more frequent enemy of farmers. It is therefore important that its habits and appearance should be known as soon as possible.

REPORT OF THE CEREALIST.

CHAS. E. SAUNDERS, B.A., Ph. D.

DR. WM. SAUNDERS, C.M.G.,
Director Dominion Experimental Farms,
Ottawa.

SIR,—I have the honour to submit herewith the third annual report of the Cereal Division.

The various problems in connection with the growing of wheat in this and other parts of Canada have occupied the greater part of my time during the past year. Attention has also been given to the other cereals as well as to the fodder crops included in the scope of this Division.

The winter months were occupied chiefly in the selecting of grain and in making milling and baking tests of important varieties and commercial mixtures of wheat. With the co-operation of the Chemical Division, a careful and thorough study was made of the milling and chemical value of the different grades of wheat in the Manitoba Inspection Division, using the crop of the previous year (1904). The results of this investigation were published in the form of a bulletin (No. 50) last June.

In February I attended the annual meeting of the American Breeder's Association, held at Champaign, Illinois, and presented a paper on 'A Natural Hybrid in Wheat.'

After the close of this meeting I visited wheat-testing laboratories in Chicago and Minneapolis, and spent part of a day at the Minnesota State Agricultural Experiment Station at St. Anthony Park. From this point I travelled to Brandon to attend the sessions of the Manitoba Grain Growers' Association. At this meeting I gave an address on the breeding and testing of wheats as carried on at the Experimental Farms.

The work of cross-fertilising in cereals was continued this year as usual, although the number of crosses made was not very large, owing to the fact that the work of previous years has given rise to such quantities of material as it is almost impossible to manage.

The study of these new types, and the selection from them of the most desirable sorts for propagation occupied much time during the summer.

Attention was also given to the second of the new races of hardy apples which are being produced at this Farm. Six crosses were made between hybrids of the first race and some of the standard apples, 121 seeds being obtained.

As soon as the cereal harvest was over I made a journey westward, visiting some of the more important wheat growing districts of Manitoba and Saskatchewan, for the purpose of studying the variations produced in wheat by differences in soil and climate, and to see to what extent the Red Fife wheat is mixed with other sorts. Many interesting observations were made, and important specimens collected on this trip.

I acknowledge with pleasure the valuable assistance rendered to me by Mr. George Fixter, foreman in charge of the field work of this Division, and by Miss M. Hager, who has aided me in the diverse kinds of work carried on in the office.

For samples of seed grain I am indebted to Prof. C. A. Zavitz, of Guelph, who sent to me Mandscheuri barley and Early Ripe oats, to Prof. Ten Eyck, of the Kansas Experiment Station, and Prof. M. A. Carleton, of the Department of Agriculture at

Washington, from both of whom were received samples of Turkey Red winter wheat, to Mr. A. Kirsche of Pfiffelbach-Apolda, for new varieties of cereals and to Mr. Wm. Farrer, of Lambrigg, N.S.W., for samples of some new Australian wheats of his own breeding.

I have the honour to be, sir,
Your obedient servant,
CHARLES E. SAUNDERS,
Cerealist.

CROSSING AND SELECTION OF CEREALS.

Increased care is being exercised every year in the selection of seed for the small groups of plants grown for breeding purposes. The improved, selected strains now being grown at this Farm furnish excellent material for this work of originating new sorts.

As the number of cross-bred kinds now on hand is so large, only a few new crosses were made this year. The conditions, as to weather, were quite favourable, and good results were obtained. In barley one cross was made, giving 14 seeds, and in wheat seven crosses, giving 80 seeds. The number of wheat flowers operated on was 104, the percentage of success being therefore nearly 77. Judging by the experience of former years this should represent nearly 75 per cent of true cross-bred kernels. It seems impossible to avoid entirely the production of self-fertilised grains.

The work of cross-fertilising was begun on June 27th and finished on July 8th.

The cross-bred seeds obtained in 1904 were sown about a foot apart each way. Most of the seeds germinated. The plants made vigorous growth and matured large quantities of seed in nearly all cases. About 90 plants were harvested, among the most interesting being some beardless types of two-row barley, and some strong, early kinds of wheat produced by crossing Aurora with Red Fife and Riga with Pringle's Champlain.

The grain obtained from the mother plants raised from the cross-bred seeds of 1903 was sown in groups, the seed from each mother plant being carefully kept separate. As every seedling in each group can fairly be regarded as a distinct variety there were in this plantation approximately 40,000 varieties of wheat, 4,000 of oats, 5,000 of barley and 1,000 of peas, a total of about 50,000 new varieties. The great majority of these were rejected before or during the harvest, but several thousand of the more promising plants were retained for more thorough examination during the winter.

In addition to these unfixed sorts there were sown about 100 other new varieties or new selections, chiefly of wheat, in small plots. These are now quite fixed in type and they presented a most striking and beautiful appearance as they ripened. A few sorts were rejected for weakness of straw or for other reasons, and the remainder will be subjected to further careful study before being tested in the larger plots. The heavy storms which occurred during the ripening season made the observations on strength of straw particularly valuable. Among the most interesting new varieties and strains in this collection may be mentioned several selections from Red Fife, which are of the highest gluten strength and some of which ripen somewhat earlier than ordinary Red Fife. There are also some superior strains of Preston, Stanley, Percy, Huron, Riga and other cross-bred sorts produced in the first few years after the establishment of the experimental farms, as well as strains of other varieties which have not yet been described. Some crosses between Colorado wheat and Common Emmer and between Red Fife wheat and wheats of the durum or macaroni class are showing desirable qualities and may prove useful for those farmers who raise wheat for chickens. One of these new sorts (known for the present under the record number of

8 C) was subjected to a partial analysis by the chemist of the experimental farms and showed the remarkably high protein content of 17½ per cent. Another variety (9 J 3) showed more than 17 per cent of protein.

Among the new sorts of wheat recently obtained from other countries the variety called 'Bobs,' which is of high quality, was watched with special interest this season. A few seeds of this wheat were sent to this farm by the originator, Mr. Wm. Farrer, of New South Wales, who states that in the warmer districts of that colony it shows considerable power to resist rust. It did not, however, withstand the attacks of rust in the climate of Ottawa, this season, so well as several of our standard sorts.

Another very interesting variety, which has been named Aurora, may also be mentioned. It was obtained by the selection of a very early and strong plant obtained by growing some mixed wheat imported from India. The amount of seed of Aurora on hand did not permit the sowing of one-fortieth of an acre this season, but the small plot sown ripened on July 21st, having matured in the remarkably short time of 87 days. This is our earliest wheat. It produces hard red kernels of good quality, but appears to be only moderately productive and has short straw. It will be further tested. It was crossed with Red Fife in 1904 and the plants raised this season from the cross-fertilised seeds were vigorous and early. They seem likely to give rise to some important new wheats.

VISIT TO MANITOBA AND SASKATCHEWAN.

About harvest time the writer travelled through portions of Manitoba and Saskatchewan for the purpose of studying the wheat fields in those provinces as well as to inspect the uniform test plots of cereals on the branch experimental farms. The principal points visited were Indian Head, Brandon, Neepawa and Dauphin. Much information of value was obtained and many interesting samples of grain were collected. The wheat fields in both of the provinces visited were found almost invariably to contain a noteworthy proportion of varieties other than true Red Fife, amounting in some instances to about 50 per cent. Many of these sorts are easily distinguishable from Red Fife, and could be eliminated by any farmer who would take pains to purify his seed. The commonest kind is a bearded wheat with red chaff which has been known in some localities under the name of Assiniboia wheat. There are perhaps two or three slightly different varieties included under this name, but it may conveniently be used for them all as they are very much alike. Altogether there were found about fifteen varieties mixed with Red Fife. The study of these is not yet completed, but it appears that, with the exception of White Fife, which is seldom met with, they are all inferior to Red Fife for the production of strong flour, and are, therefore, a menace to the reputation of the wheat of these provinces. The varieties with very short heads (club wheats) are especially poor and should be regarded in almost the same light as noxious weeds.

CEREALS IN THE PEACE RIVER COUNTRY.

Samples of such varieties of grain as seem likely to be of value to settlers in the district drained by the Peace River are sent to them from time to time from this farm. Some reports and samples have been received back from these settlers.

Mr. Allan Brick, of Peace River Landing, sent very good samples of Stanley and Preston wheat and Tartar King oats from the crop of 1904.

Mr. Charles Bremner, of Spirit River, reported concerning the season of 1904: 'The barley (Odessa) produced good samples, also the oats (Tartar King), but the wheat was badly frozen in July and August.'

The Rev. Father Josse, O.M.I., of Spirit River, reported: 'The samples you sent us have succeeded very well. Both the wheats ripened all right (Stanley and Gehun). Odessa barley and Flying Scotchman oats have succeeded perfectly well. This year was a pretty dry one.'

The Rev. Robert Simpson, of Spirit River reported: 'The season was against us. We sowed on April 27th and all were ripe by August 25th. The Preston wheat and Tartar King oats yielded heavily. Of course the straw was shorter than it would have been had we had rain.'

The Rev. Brother Laurent, O.M.I., of the St. Bernard Mission, Little Slave Lake, reported that the Tartar King oats did very well, but that the varieties of wheat sent to him (Stanley, Preston and Early Riga) did not do so well as the Red Fern which has been grown there for four years. Odessa and Clifford barley did not suit the conditions in that section so well as the barley which was introduced several years ago.

Only one report on the results of the season of 1905 has thus far been received:

Mr. William Smith, of Fort Vermilion, reports that his samples were sown on June 6th and cut August 15th. The quantities sown were 1 lb. each, and the amounts harvested were: Preston wheat, 26 lbs.; Harold wheat, 11 lbs., and Flying Scotchman oats, 12 lbs. He says: 'The Preston wheat ripened fully as early as the Harold. The oats came to maturity about the same date as the wheat, and the kernels were plump and good.'

It is evident, from these reports, that great differences exist in the various sections of country drained by the Peace River, and that much further experimental work with cereals will be necessary before the possibilities in regard to grain growing there can be fully understood.

GRADES OF WHEAT IN THE MANITOBA INSPECTION DIVISION.

The results of the study of the various grades of wheat in the Manitoba Inspection Division (crop of 1904) have already been published in Bulletin No. 50 of the Experimental Farm series. For the purpose of making further observations on the character of the wheat some of the seed in each grade from No. 1 Hard to No. 5 was sown on this farm last spring, and observations were made, later in the season, on the character of the grain produced from each grade.

The proportion of heads not of the Red Fife type was determined for each grade with the following results:—

	Per cent.
No. 1 Hard	8·4
No. 1 Northern	9·8
No. 2 "	6·9
No. 3 "	6·2
No. 4 Extra	7·1
No. 4	9·3
No. 5	9·7

As the samples sown were thoroughly representative of the averages of the grades, the above figures show clearly that the lower grades contain, as a rule, about the same proportions of Red Fife as the higher grades. The figures given do not represent the total quantities of other varieties present, but only those which could be distinguished from Red Fife without much difficulty.

The weight of crop produced from the plot of each grade was not determined but was certainly greatest in the plots where good seed was sown.

The quality of the different samples of grain harvested was carefully observed. The differences found were, however, quite insignificant in most respects. Each sample contained about 98 per cent of hard kernels; but while practically all the kernels

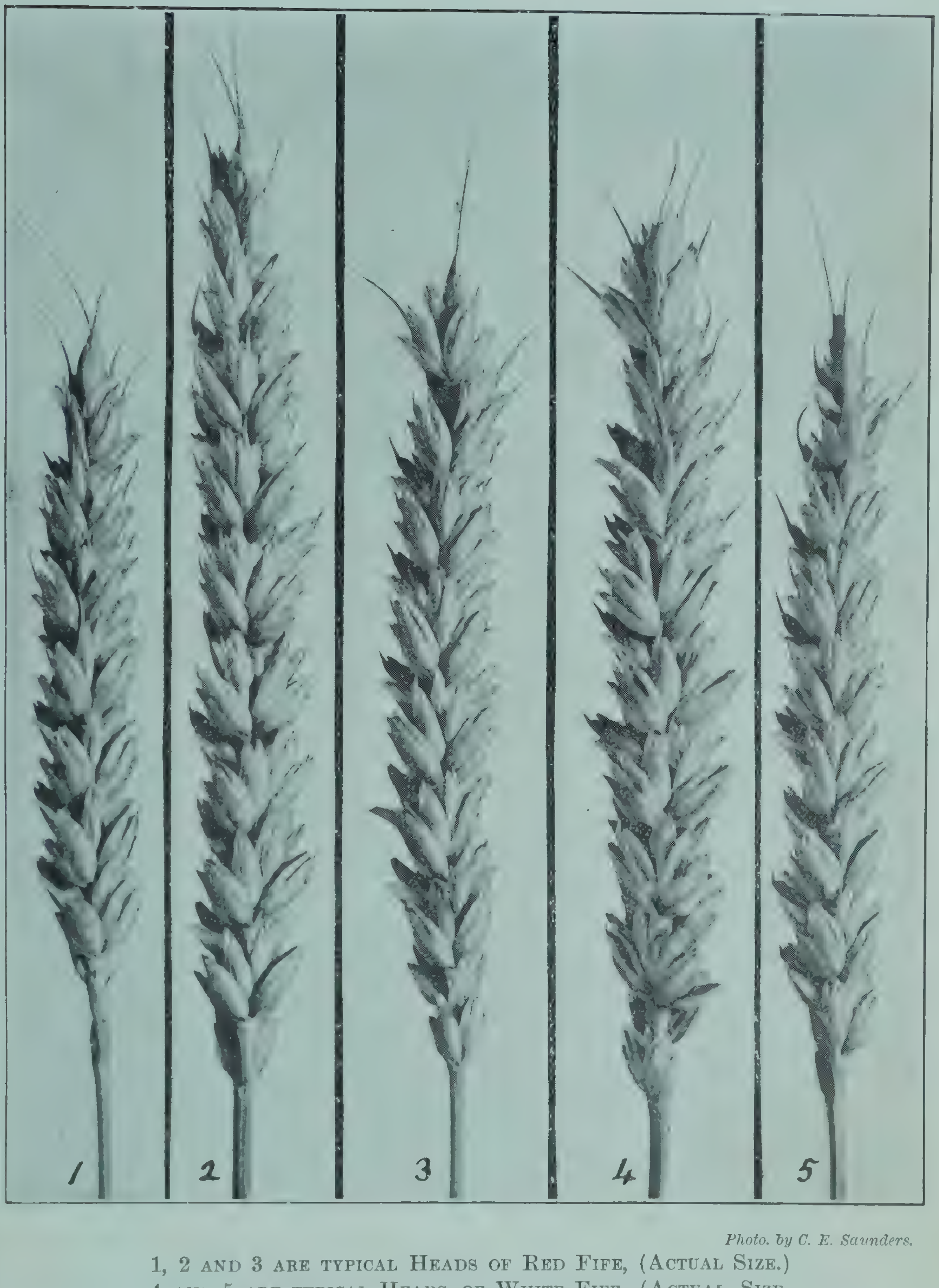


Photo. by C. E. Saunders.

1, 2 AND 3 ARE TYPICAL HEADS OF RED FIFE, (ACTUAL SIZE.)
4 AND 5 ARE TYPICAL HEADS OF WHITE FIFE, (ACTUAL SIZE.

produced from the highest grades of seed had a red skin, the crop from No. 2 Northern and the grades below this showed a small proportion of kernels with a yellow skin. These are, of course, not necessarily inferior in quality, though less popular at present. In plumpness there was a very slight difference in favour of the crop from the higher grades.

The red chaff, bearded heads ('Assiniboia' wheat), which were the most conspicuous type present other than Red Fife, gave grain quite as free from soft kernels as the Red Fife and of a richer red colour. The Assiniboia did not ripen appreciably earlier than the Red Fife. These observations, as well as those made by the writer in the wheat fields of Manitoba and Saskatchewan, show clearly that the prevailing idea that this Assiniboia wheat is an early, soft variety of poor colour is quite erroneous. Though undoubtedly inferior to Red Fife for the production of strong, pale-coloured flour, the appearance of the grain is better than Red Fife if judged by the ordinary standards. This serves to show that colour and hardness alone are very poor indications of actual milling value.

DESCRIPTIONS OF VARIETIES OF WHEAT.

So far as the writer is aware no careful descriptions of the most important varieties of wheat which have been long under cultivation in Canada have ever been published. It seems necessary therefore to describe a few of our best known sorts, in regard to some of which considerable confusion and misunderstanding exist.

Red Fife (Scotch Fife).—Kernels red, inclined to pale rather than dark red, of medium size but somewhat short. Heads of medium length, averaging about 3¾ inches long at Ottawa, tapering, essentially beardless, but having, as a rule, a few elongated awns (generally from 3 to 7) towards the tip. In rare cases some of these awns may be as much as 1½ inches in length, but they are usually less than an inch long. In some instances the heads are devoid of conspicuous awns. Chaff smooth and usually of a straw-yellow colour, though in some climates it takes a faint reddish tinge, not sufficient however to cause any difficulty in separating the heads from those of other sorts with true red chaff. The spikelets are set at moderate distances apart, there being usually not less than 16 spikelets in head 3½ inches long and not less than 17 in a head 4 inches long. Straw stiff and of good length, usually about 46 inches long at Ottawa. Ripens rather late and gives a good yield. It makes exceptionally strong flour of a rich cream colour (not essentially white as is often supposed).

Red Fife was introduced into Canada by Mr. David Fife (not Fyfe), who happened to obtain one kernel of it mixed with a quantity of wheat which came to him from Dantzic by way of Glasgow. Red Fife is still grown in central Europe under the name of Galician. The variety from Hungary, known as Hungarian Mountain, appears also to be identical with Red Fife.

The annexed plates show some typical heads of Red Fife and of other similar varieties, and also, some unusual heads of Red Fife. Owing to the similarity which exists between Red Fife and some other sorts any attempt at hand selection of the heads of Red Fife should be made only in fields of *known purity.* Any heads of White Russian which might be present would be almost sure to be picked out on account of their unusual length, and thus in the course of a few years by repeated selections of the largest heads a serious proportion of this poorer variety would inevitably be present. In the opinion of the writer it is unsafe as a rule to select Red Fife with a view to saving seed from specially large heads. The selection of *typical* heads should be the first aim.

White Fife.—A full description of this wheat is unnecessary as it is practically identical with Red Fife in all respects except in regard to the colour of the skin of the kernel. Repeated tests at the experimental farms have shown that this wheat gives practically the same yield as Red Fife, and ripens at the same time, notwithstanding that many farmers believe the White Fife to be earlier and more productive. As found in commerce, White Fife seldom contains less than 20 per cent of red kernels, probably Red Fife and White Russian, but the kernels of true White Fife have a yellowish skin, quite distinct from the reddish skin of Red Fife. It is generally supposed that White Fife is inferior to Red Fife for milling purposes, but careful tests made by the writer showed that (using *pure* White Fife) the two varieties behaved in the same manner when milled and gave flour which was practically identical in colour, in power to absorb water, and in ability to produce a large, high loaf. The present prejudice against White Fife is clearly without just grounds, and arises from confusing soft starchy samples of Red Fife (which are unpopular among our millers) with White Fife. However, as the colour of the skin of each variety is constant, there is no difficulty in distinguishing soft Red Fife from either soft or hard White Fife. White Fife is not, as is sometimes supposed, essentially a soft wheat, but usually shows about the same degree of hardness as Red Fife grown in the same soil and climate.

White Russian.—Kernels red, rather large and inclined to be starchy. Heads tapering, essentially beardless (but usually with a few prominent awns at the tip), and above medium length, being as a rule about 4 inches long at Ottawa. Chaff yellowish, smooth. In typical heads the spikelets are set rather far apart. A head 4 inches long generally has 16 or fewer spikelets. Straw stiff and of good length, usually about 47 inches long at Ottawa. Ripens rather late and gives a good yield. This variety makes flour of a less pronounced cream colour than Red Fife, but the flour has distinctly less strength. White Russian should not be grown in those districts from which wheat is sold for export, as its production would tend to lower Canada's present enviable reputation for strength in wheat.

Wellman's Fife.—A prolonged and careful study of this wheat has satisfied the writer that it is the same as White Russian, mixed, however, as a rule, with a varying proportion of Red Fife. Its cultivation should be discouraged wherever the production of wheat of the highest quality is aimed at. It was obtained by Mr. D. L. Wellman, of Minnesota, who selected the best looking beardless heads out of a field of mixed wheats, obtained by him under the name of Saskatchewan Fife. Under such circumstances it was natural that the selection should consist chiefly of White Russian, the heads of which are above medium length. The average yield given by Wellman's Fife is practically identical with that obtained from White Russian.

Monarch.—This wheat is also a strain of White Russian, varying somewhat in its purity, and giving about the same average returns as that variety.

McKendry's Fife, which was re-selected at the Minnesota Experiment Station and was given the name 'Minnesota No. 181,' is another strain of White Russian. It gives a good yield, but shows as a rule little or no superiority over the original variety as grown at the Dominion Experimental Farms.

Minnesota No. 163 also appears to be identical with White Russian. In productiveness it has shown itself inferior to Minnesota No. 181.

Powers' Fife re-selected and sent out by the Minnesota Experiment Station under the name 'Minnesota No. 149,' is a pure strain of Red Fife of excellent quality, but it has proved somewhat less productive than the parent variety at all of the Dominion Experimental Farms except Indian Head, Sask.

Club.—This variety was obtained from a district in Manitoba, where it is being grown to some extent. It is not being tested in the larger plots at this farm on account of its poor quality. Kernels rather dark red, of about medium size. Heads short, compact, thickened towards the tip, essentially beardless, but often having at the tip a few awns about half an inch long. Well-developed heads are about 2¾ inches long. Chaff reddish, smooth. Straw moderately stiff and of medium or below medium length. Ripens a few days before Red Fife. Rusts rather badly, as a rule, at Ottawa, but produces good kernels in some parts of Manitoba. In spite of the excellent appearance of this wheat, when grown under favourable conditions, it is to be *entirely condemned* for purposes of export or for the production of strong, pale flour at home. The colour of the flour made from Club wheat is a dark unattractive yellow—not at all to be compared with the fine cream colour of Red Fife flour. In gluten also the Club shows itself very deficient, having a much smaller quantity than the Red Fife and the gluten being of inferior quality. In making dough from Club wheat flour it was found that less water was taken up than in making dough from Red Fife, and the volume of the loaf produced was smaller. The general appearance of bread made from Club wheat flour is extremely poor, and there is no doubt that if this wheat were grown to any large extent in Manitoba it would seriously injure the present high reputation of the wheat of that province.

Unfortunately, owing to the fact that the market value of Manitoba wheat is determined by colour and hardness rather than by quality for flour production, Club wheat commands a good price, being generally quite hard and of a rich red colour. Indeed, the writer has been informed that it sometimes commands a higher price than pure Red Fife.

Hungarian White.—This variety was obtained from a seedsman in Germany. It is a promising sort, being fairly early in ripening and of good quality. Kernels red, of about medium size, but somewhat elongated. Heads bearded, tapering, of about medium size. Chaff yellowish, smooth. Straw moderately stiff and of good length. Ripens a little before Red Fife. Makes excellent, strong flour. This wheat resembles Red Fern in many respects, but is distinguished from that variety by the greater length of kernel in the Hungarian.

FIFE WHEATS.

Having endeavoured to give a satisfactory definition of true Red Fife and of some of the other so-called Fife wheats, it would seem desirable to state if possible the distinguishing characters of the Fife group, especially since the Grain Inspection Act of 1904 is so worded as to require certain proportions of red wheat of the Fife class in all but one of the higher grades in the Manitoba Inspection Division. It would have been convenient to reserve the name Fife for varieties similar to true Red Fife or White Fife in general appearance and quality, but the term is already in use, as we have seen, for different strains of White Russian, a wheat which produces flour having distinctly less strength than that made from Red Fife. It seems impossible, therefore, at present to give any narrow limitation to the term. The effect of the Grain Inspection Act is, naturally, to broaden the meaning of the word Fife (in the absence of any legal definition of it) to include all varieties of spring wheat grown in the prairie provinces.

CEREALS IN SMALL PLOTS.

An alphabetical list of the principal varieties of the different cereals grown in small plots during the past season is here given. The total number of these plots was 216. Those varieties which are given under letters and numbers are new sorts produced at this Farm, but not yet named.

Spring Wheat

3 B 3 (Dawn × Red Fife).
6 F 2 (Red Fife × Polish).
6 T " "
7 D (Red Fife × Roumanian).
7 E " "
8 C (Red Fife × Goose).
9 G (Common Emmer × Colorado Wheat).
9 J 3 " "
10 F (Colorado Wheat × Common Emmer).
Advance (2 strains).
Alpha (selected).
Aurora.
Banat.
Bearded March.
Beaudry
Bishop (6 strains).
Bobs.
Burkinshaw's Early.
Campbell's White Chaff,
Cape.
Chester (selected).
Club.
Countess (selected).
Downy Riga (5 strains).
Early Haynes' Blue Stem.
Early Sonora.
Ebert (selected).
Eurasian.
Fraser Red.
Grant (3 strains).
Gurke.
Herisson Beardless.
Hindoo.
Hungarian Mountain.
Huron (4 strains).
Japanese.
John Brown.
Ladoga (Black Sea).
Liberty.
Markham (2 strains).
Miller.
Moscow.
Naples.
Nixon A.
Onegafife.
Onegagehun.
Outlook.
Percy (2 strains).
Persian Black.
Preston (10 strains).
Pringle's Champlain (3 strains).
Pringle's Defiance.
Prospect (2 strains).
Red Bearded.
Red Fife (12 strains).
Red Preston.
Red Riga (3 strains).
Red Swedish.
Riga (2 strains).
Robin's Rust Proof.
Sicilian.
Spence Yellow.
Stanley (3 strains).
Strubes.
White Fife (5 strains).
Yellow Cross.
Yellow Fife.

Macaroni or Durum Wheat.

Adjini Red.
Arneutka.
Italian.
Madonna.
Mahmoudi Yellow.
Polish.
Red Indian.
Sleaford.
Sorentino.

Emmer and Spelt.

9 H 2 (Common Emmer × Colorado Wheat).
9 K 2 " "
Black Bearded Spelt.
Double Emmer.

Oats.

Abyssinia.
Aitken Black.
Australian.
Banner (2 strains).
Bayonet.
Bergs (black).
Beseler.
Black Mesdag.
Bonanza.
Brown Algerian.
California Prolific (black).
Clydesdale.
Cream Egyptian.
Doncaster Prize.
Early Archangel.
Early Blossom.
Early British.
Early Maine.
Early Ripe.
Eureka.
Flying Scotchman.
Leutenwitzer.
Liberty.
Longhouton.
Newmarket.
Norwegian Black.
Oderbruch.
Prince Royal.
Rennie's Prize White.
Salines.
Scottish Chief.
Selchower.
Selected Columbus.
Selected Daubeney.
Selected White Giant.
Sheffield Standard.
Tobolsk.
Tunis (brown).
Victoria Prize.
White Russian.
White Schonen.
White Wonder.
Zhelannii.

Six-row Barley.

Blue Short Head.
Hulless White (beardless).
Petschora.
Phœnix.
Small Blue Naked.
Success (beardless).
Surprise.
Taganrog.
Vanguard.

Two-row Barley.

Black Two-row.
Early Chevalier.
Erfurt White.
Gambrinus.
Hofbrau.
Improved Thanet.
Jewel.
Kinver Chevalier.
Large Naked.
Prize Prolific.
Triple Naked (beardless).

Peas.

Alma.
Arthur (2 strains).
Bright.
Bruce.
Centennial.
Creeper.
Elder.
Elephant Blue.
Fergus.
Forrest.
French Canner.
Green Marrowfat.
Harrison's Glory.
Maple.
Multiplier.
New Potter.
Norwegian Grey.
Oddfellow.
Perth.
Trilby.

Rye.

Ottawa Select (spring).
Dominion (winter).

UNIFORM TEST PLOTS OF CEREALS, FIELD ROOTS AND FODDER CORN.

The standard and new varieties of cereals which are obtainable commercially are annually grown in plots of one-fortieth of an acre, along with the cross-bred sorts produced at the Farms and a number of other varieties obtained from various sources. The field roots and fodder corn are grown in similar plots, and the yield per acre is usually estimated from the crop obtained from one-hundredth of an acre. The object of these tests is to determine the relative productiveness, earliness, &c., of the different varieties. Those which for a series of years are found to be distinctly inferior are rejected, and strong efforts are made to keep the list within as small bounds as possible without omitting anything which may ultimately prove of value.

The number of these larger plots grown during the past season was as follows:—Spring wheat, 59; macaroni wheat, 11; winter wheat, 19; emmer and spelt, 10; oats, 79; six-row barley, 41; two-row barley, 25; winter barley, 1; peas, 33; spring rye, 1; winter rye, 4; mixed grain, 6; soja beans, 2; field beans, 4; flax, 7; millet, 6; turnips, 20; mangels, 17; carrots, 11; sugar beets, 8; Indian corn, 33; making a total of 397 plots. These represent about 340 varieties.

Some of the varieties mentioned in the Report of the Experimental Farms for 1904, have been discontinued on account of lateness, small yield, or for other defects.

PREPARATION OF LAND FOR THE UNIFORM TEST PLOTS.

The system of cultivation adopted for the land devoted to the experimental plots is necessarily somewhat different from that which is generally considered advisable in ordinary farming; but it is worthy of mention that abnormally large quantities of fertilising material are not employed. The land used for the plots consists of three separate fields, and a three-year rotation is practised. Each field receives every third year a dressing of fresh barn-yard manure. This has been applied in the past at the rate of only twelve tons per acre, but this amount has been found insufficient whenever the manure has not been of the highest strength. The quantity is therefore being increased to 18 tons per acre. This is at the rate of 6 tons per acre for each year. While this is a somewhat larger quantity of barn-yard manure than is used in ordinary farming, it must be remembered that there is no opportunity in this case for the ploughing under of sod or for allowing the land to be used sometimes for pasture, as is the common practice. For these reasons it seems necessary to apply the manure in somewhat greater quantities than usual, though it cannot be fairly claimed that the land is unduly enriched by this method. The manure is spread on the ground and ploughed under in spring. The field is then used for roots, fodder corn and other hoed crops. In the autumn, after the harvest is over, the land is ploughed about seven inches deep, and is left in that condition until the following spring, when it is cultivated twice with a two-horse cultivator and harrowed twice with a smoothing harrow. Cereals are then sown. After the grain is harvested the land is ploughed about three or four inches deep, to start the shed grain and any weed seeds present, and is again ploughed a few weeks later about seven inches deep. In the following spring it is prepared as before and cereals are again sown. It is not, however, the practice to sow the same cereal twice in succession on the same piece of land.

SELECTION OF SEED FOR UNIFORM TEST PLOTS.

In order to obtain the seed for the uniform test plots in the best condition, and as nearly as possible in a state of absolute purity, selected heads are gathered by hand from the plots just before the grain is cut. About eight pounds of heads are harvested in this way. During the winter these selected samples are carefully threshed and cleaned by hand; and the grain to be sown the next season is thus brought to a very high standard of purity. This method has been used for several years with wheat and barley; and is being continued with these grains. In oats, however, the selection of heads is not usually carried out unless the grain in the plot shows signs of being mixed. It is much more difficult to select the heads of oats; and the plots are always injured more or less while the work is being done, on account of the growth of the oats being very thick.

In all cases, when the seed for the plots is not obtained by hand selection in the field, the crop is thoroughly screened and carefully hand-picked before any of it is sown.

IMPORTANCE OF EARLY SOWING OF CEREALS.

Repeated tests have been made at this Farm to ascertain the best time in spring for the sowing of cereals in order to obtain the largest possible yield. The experiments have proved that in this climate cereals should generally be sown about as soon as the land can be brought into proper condition. The reduction in yield due to delay in seeding is usually considerable, even when the delay is only a week long. The loss is especially serious with wheat and oats, and is sometimes quite disastrous in seasons when rust is abundant. The comparatively large yields obtained in the experimental plots on this Farm are due in part to early sowing.

The best time for sowing cereals on this Farm has been found to be from about April 20th to 26th in an ordinary season.

WEATHER.

The past season was on the whole very favourable for crops. The weather during the spring and early summer months was about normal in character, but in July and August there were some heavy storms which caused the grain to lodge to a considerable extent. Such severe tests of the strength of straw are, however, of great value in experimental work. Rust on cereals was prevalent, but did less damage than in the previous season. Field roots and Indian corn gave good yields owing to the abundance of moisture throughout the season, and would no doubt have done even better had not the general character of the season been somewhat cool.

SPRING WHEAT.

The following varieties of spring wheat were added to the uniform test plots this season:—

Hungarian White.—See 'Descriptions of Varieties of Wheat.'

Kirsche.—This wheat was received from Mr. A. Kirsche of Pfiffelbach-Apolda. It produces large red kernels. The head is short and beardless, slightly tapering, and with the spikelets set very close together. The chaff is smooth and somewhat reddish. As this wheat is late in ripening, is badly affected by rust and shows very distinct lack of strength in its gluten it seems unnecessary to further test it in this country.

The plots of wheat were sown on April 24th, and were all one-fortieth of an acre in extent. The seed was used at the rate of 1½ bushels to the acre. The soil was a loam of good quality.

The yield per acre is expressed in 'bushels' of 60 pounds.

*Varieties produced at the Central Experimental Farm are marked with an asterisk.

Spring Wheat—Test of Varieties.

Number.	Name of Variety.	Date of Ripening.		No. of Days Maturing.	Length of Straw including Head.	Character of Straw.	Length of Head.	Yield per Acre.		Weight per measured bushel after cleaning.	Rusted.
					Inches.		Inches.	Bush.	Lbs.	Lbs.	
1	Australian F	Aug.	3	101	46 to 48	Stiff	3½ to 4	39	40	60	Badly.
2	Chester *	July	29	96	49 " 51	Medium	3¼ " 3¾	37	40	60	Considerably.
3	Wellman's Fife	Aug.	5	103	50 " 52	Stiff	3½ " 4	36	20	60	Slightly.
4	Advance *	"	3	101	52 " 54	"	3½ " 4	36	..	60½	"
5	Australian No. 12	"	2	100	47 " 49	"	3 " 3½	35	20	57¼	Considerably.
6	Early Riga *	July	27	94	45 " 47	Medium	2¾ " 3¼	35	..	60¼	"
7	Preston *	Aug.	2	100	47 " 49	Stiff	3½ " 4	34	20	61	"
8	Pringle's Champlain	"	1	99	45 " 47	Weak	3¼ " 3¾	34	20	60	"
9	Gehun	July	26	93	45 " 47	Medium	2¾ " 3¼	34	20	59	"
10	Dawn *	Aug.	3	101	47 " 49	Stiff	3½ " 4	34	20	59½	"
11	Huron *	"	5	103	50 " 52	"	3¼ " 3¾	33	30	59	Slightly.
12	Red Fife	"	7	105	48 " 50	"	3 " 3½	33	20	59	Badly.
13	Red Fern	"	3	101	52 " 54	"	3½ " 4	33	20	62¼	Slightly.
14	McKendry's Fife (Minn. 181)	"	5	103	50 " 52	"	3½ " 4	33	..	61	"
15	Hungarian White	"	5	103	47 " 49	Medium	3¾ " 4¼	33	..	60¾	"
16	Riga *	July	27	94	46 " 48	Stiff	3 " 3½	33	..	60	Considerably.
17	Downy Riga*	"	27	94	45 " 47	Medium	2¾ " 3¼	32	50	60	"
18	Laurel *	Aug.	7	105	47 " 49	"	3¼ " 3¾	32	40	58¾	Slightly.
19	Stanley *	"	2	100	47 " 49	Stiff	3½ " 4	32	20	59	Considerably.
20	White Russian	"	14	112	51 " 53	Weak	3½ " 4	32	20	56½	Badly.
21	Australian No. 9	"	2	100	41 " 43	Medium	3¼ " 3¾	32	20	59½	Considerably.
22	Monarch	"	8	106	47 " 49	Stiff	3¼ " 3¾	31	40	59½	Slightly.
23	Ebert *	July	29	96	44 " 46	Medium	3 " 3½	31	20	59¼	Badly.
24	Colorado	Aug.	5	103	48 " 50	"	3 " 3½	31	..	58	Considerably.
25	Bishop *	"	1	99	46 " 48	"	3¼ " 3¾	30	40	56¾	"
26	Clyde *	"	7	105	46 " 48	Weak	3¼ " 3¾	30	40	59	Badly.
27	Minnesota No. 163	"	8	106	51 " 53	Stiff	3 " 3½	30	20	60	Slightly.
28	Australian No. 28	"	3	101	44 " 46	"	3 " 3½	29	40	60	Considerably.
29	Herisson Bearded	"	8	106	48 " 50	Medium	1½ " 2	29	20	61	"
30	Countess *	"	2	100	47 " 49	"	3¼ " 3¾	29	..	59	"
31	Percy *	"	2	100	47 " 49	Stiff	3½ " 4	28	40	59½	"
32	White Fife	"	8	106	47 " 49	"	3¼ " 3¾	27	20	60	Slightly.
33	Nixon *	"	8	106	48 " 50	"	3 " 3½	27	..	60½	Considerably.
34	Haynes' BlueStem (Minn. 169)	"	7	105	51 " 53	Medium	3½ " 4	27	..	57½	"
35	Marvel	"	14	112	52 " 54	Weak	3¾ " 4¼	26	40	55	Badly.
36	Power's Fife (Minn. 149)	"	8	106	47 " 49	Stiff	3¼ " 3¾	26	40	60½	Slightly.
37	Weldon *	"	5	103	48 " 50	Medium	3 " 3½	26	20	59	Badly.
38	Blue Stem	"	14	112	51 " 53	"	3½ " 4	25	20	56	"
39	Saumur	"	14	112	43 " 45	Weak	2½ " 3	25	20	56	"
40	Pearl	"	14	112	51 " 53	Stiff	3 " 3½	23	40	58	"
41	Kirsche	"	15	113	47 " 49	"	2 " 2½	20	20	57	"

Most Productive Varieties of Spring Wheat.—Excluding the macaroni wheats, which are considered separately, the most productive varieties of spring wheat at this Farm for the last five years have been Preston, Herisson Bearded, Advance and Pringle's Champlain. Huron and Red Fern have given almost as large yields. All of these are bearded wheats, Pringle's Champlain and Red Fern being probably the best for milling purposes.

Among the most productive beardless varieties may be mentioned Red Fife, White Fife, White Russian and Laurel. Of these Red Fife and White Fife are the best for making strong flour.

Earliest Varieties of Spring Wheat.—The earliest variety of spring wheat grown on this Farm during the past season was Aurora. Only a very small amount of seed of this wheat is on hand, and it is not yet available for distribution. The earliest varieties grown in the regular plots were Early Riga, Ebert, Riga, Downy Riga and Gehun. These ripen as a rule about two weeks before Red Fife or White Fife at this Farm. The variety called Bishop, which was described in the report for last year, ripens about 4 or 5 days later than the earliest group, and the well-known sorts, Preston and Stanley, ripen about 2 or 3 days later than Bishop.

The very early sorts mentioned are being selected and propagated, but thus far an extremely limited distribution of one or two of them is all that is possible. Such samples are only sent when there is good reason to believe that they will be of real value to the farmers applying for them. It should be kept in mind that extreme earliness is usually associated with a rather low yield and short straw. It is therefore often unwise to grow such wheats in districts where the ripening season is long enough to mature the more vigorous sorts such as Preston, Stanley, Pringle's Champlain or the still later varieties Red Fife and White Fife.

The earliest kinds of wheat which are as yet included in the regular distribution enough to mature the more vigorous sorts such as Preston, Stanley, Pringle's Champlain. Stanley and Percy are beardless sorts.

MACARONI OR DURUM WHEAT.

The term 'macaroni' wheat is generally employed to designate those extremely hard varieties with large kernels of which 'Goose' or 'Wild Goose' is the best-known example in Canada. The different sorts of macaroni wheat are by no means identical in quality, though they are usually considered to be so. They are looked upon with disfavour by millers; and farmers who grow any wheat of this class should exercise great care to prevent it from becoming mixed with wheat which is to be sold for flour-making.

As a rule, these wheats suffer less from drought and from rust than other sorts. They may, therefore, in some cases, be grown to advantage, especially in any rather dry district where rust is apt to be severe. They are not, however, to be generally recommended for damp climates. It should also be borne in mind that the market price of macaroni wheat is usually lower than that paid for varieties of wheat which are popular for milling purposes.

The plots of macaroni wheat were one-fortieth of an acre in extent. The seed was sown on April 20th at the rate of 1¾ bushels to the acre. The soil was a sandy loam.

The yield per acre is expressed in 'bushels' of 60 pounds.

MACARONI WHEAT—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No. of Days maturing.	Length of Straw, including Head.	Character of Straw.	Length of Head.	Yield per acre.		Weight per measured bushel after cleaning.	Rusted.
				Inches.		Inches.	Bush.	Lbs.	Lbs.	
1	Roumanian	Aug. 3	105	48 — 50	Stiff	2½ — 3	40	20	62½	Slightly.
2	Beloturka	" 3	105	46 — 48	Medium	2¼ — 2¾	39	..	64½	Considerably.
3	Yellow Gharnovka	" 3	105	49 — 51	Stiff	2¾ — 3¼	37	..	62½	"
4	Gharnovka	" 3	105	49 — 51	"	2¾ — 3¼	32	20	61½	"
5	Black Don	" 7	109	48 — 50	Medium	2¼ — 2¾	28	40	59½	Slightly.
6	Velvet Don	" 5	107	48 — 50	Stiff	2¼ — 2¾	28	20	59¼	Considerably.
7	Kahla	" 4	106	45 — 47	"	2¼ — 2¾	26	20	57	"
8	Kubanka	" 8	110	50 — 52	"	2 — 2½	25	40	62	Slightly.
9	Goose	" 7	109	46 — 48	"	2¼ — 2¾	20	40	63	"
10	Mahmoudi	" 7	109	42 — 44	Medium	2¼ — 2¾	20	20	58	Considerably.
11	Medeah	" 4	106	44 — 46	Stiff	2½ — 3	19	.	59	"

Roumanian, which stands at the head of the list this year, has also given the highest average yield during the past five years.

WINTER WHEAT.

The plots of winter wheat were sown on September 8th, 1904. All the plots were one-fortieth of an acre, and the seed was used at the rate of 1¾ bushels to the acre. The soil was a clay loam.

Owing to the cool weather which prevailed in September and October the growth on the plots was less vigorous than usual when winter set in. The ample covering of snow, however, prevented serious injury during the cold weather, and the plots made good growth in the spring and early summer. An unusually heavy crop of grain was harvested.

The well-known variety, Turkey Red, is omitted from the plots this season, owing to the fact that the seed was not in a satisfactory condition. Two new strains of selected Turkey Red were obtained this past summer, one from the Kansas Experiment Station (Turkey Red No. 380), and the other through the Department of Agriculture at Washington. These were sown in the plots this autumn.

WINTER WHEAT—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No. of Days maturing.	Length of Straw, including Head.	Character of Straw.	Length of Head.	Yield per acre.		Weight per measured bushel after cleaning.	Rusted.
				Inches.		Inches.	Bush.	Lbs.	Lbs.	
1	American Banner	July 21	316	49 — 51	Stiff	2¾ — 3¼	50	..	60	Considerably.
2	Gold Coin	" 20	315	49 — 51	"	2¾ — 3¼	49	..	60	"
3	Jones' Winter Fife	" 20	315	51 — 53	"	3¼ — 3¾	45	20	61	"
4	Abundance	" 21	316	50 — 52	"	3 — 3½	43	40	59	"
5	Early Red Clawson	" 21	316	54 — 56	Weak	3 — 3¾	43	..	60	Badly.
6	Dawson's Golden Chaff	" 20	315	49 — 51	Stiff	3 — 3½	42	20	60	Considerably.
7	Prosperity	" 21	316	51 — 53	"	3¼ — 3¾	42	20	61	Slightly.
8	Kharkov	" 23	318	46 — 48	Medium	2¼ — 2¾	41	..	61½	Considerably.
9	Red Chief	" 21	316	51 — 53	"	2½ — 3¼	40	40	57¾	"
10	Buda Pesth	" 20	315	52 — 54	"	3 — 3¾	39	40	60¾	Slightly.
11	Early Windsor	" 21	316	46 — 48	Stiff	2¾ — 3¼	39	20	60	"
12	Invincible	" 21	316	48 — 50	"	3½ — 4	37	40	60¾	"
13	Egyptian Amber	" 24	319	50 — 52	"	3 — 3¾	36	20	60	Considerably.
14	Red Velvet Chaff	" 20	315	45 — 47	"	3 — 3½	35	40	60½	"
15	Silver Sheaf	" 20	315	55 — 57	"	3¾ — 4¼	35	40	60½	Slightly.
16	Imperial Amber	" 24	319	55 — 57	"	3¾ — 4¼	34	..	62	Considerably.
17	Padi	" 22	317	44 — 46	"	2¾ — 3¼	31	40	59	Slightly.
18	Reliable	" 25	320	46 — 48	"	3¼ — 3¾	30	..	60	Considerably.

EMMER AND SPELT.

The plots of emmer and spelt were one-fortieth of an acre. The grain was sown on April 20th, at the rate of about 120 lbs. per acre. The soil was a clay loam.

Long Emmer and Single Emmer will be rejected from the plots next year on account of their extreme lateness in ripening.

EMMER AND SPELT—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No. of days maturing.	Length of Straw, including Head.	Character of Straw.	Length of Head.	Yield per Acre.	Weight per measured bushel after cleaning.	Rusted.
				Inches.		Inches.	Lbs.	Lbs.	
1	White Spelt	Aug. 11	113	49 — 51	Stiff	4¼ — 4¾	2,400	27½	Considerably.
2	Smooth Spelt	" 15	117	44 — 46	"	3¾ — 4¼	2,120	28	Slightly.
3	Common Emmer	" 1	103	46 — 38	"	1½ — 2	2,060	36½	"
4	Thick Emmer	" 3	105	43 — 45	"	2½ — 3	2,060	30½	Considerably.
5	White Emmer	" 8	110	45 — 47	"	2½ — 3	1,920	30	Slightly.
6	Red Emmer	" 8	110	41 — 43	"	2¼ — 2¾	1,880	32	"
7	Long Emmer	" 23	125	47 — 49	"	3¾ — 4¼	1,660	27	"
8	Red Spelt	" 14	116	46 — 48	"	3½ — 4	1,620	29	"
9	White Bearded Spelt	" 14	116	47 — 49	"	3¾ — 4¼	1,620	27½	"
10	Single Emmer	" 30	132	34 — 36	"	2½ — 3	1,380	24½	"

OATS.

The varieties added to the plots this season are:—

Dinauer and *Fichtel Mountain.*—These were obtained from Germany. They are white oats with loose, open heads.

Kirsche.—This was obtained from Mr. A. Kirsche, of Pfiffelbach-Apolda. It is a white oat with a loose, open head.

Green Russian.—This variety is grown in some parts of Manitoba, but had not been tested, previously, at this Farm. It is a mixture of at least two sorts, white and yellow, both having loose, open heads.

The plots were sown on April 26th and 27th; the seed being used at the rate of two bushels per acre for most varieties, but in somewhat greater quantities whenever the oats were of unusually large size. The plots were one-fortieth of an acre. The soil varied from a sandy loam to a clay loam.

The yield per acre is expressed in 'bushels' of 34 pounds.

*Varieties produced at the Central Experimental Farm are marked with an asterisk.

OATS—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No. of days maturing.	Length of Straw, including Head.	Character of Straw.	Length of Head.	Yield per Acre.		Weight per measured bushel after cleaning.	Rusted.
				Inches.		Inches.	Bush.	Lbs.	Lbs.	
1	Banner	July 31	96	40 — 42	Medium	7½ — 8¼	84	4	32¾	Considerably.
2	White Giant	Aug. 1	97	41 — 43	"	7 — 7¾	84	4	33½	"
3	Uberfluss	July 31	95	45 — 47	Weak	7½ — 8½	80	..	31½	Badly.
4	Bavarian	Aug. 1	96	42 — 44	Medium	8 — 9	77	22	32	Considerably.
5	Improved American	" 1	97	42 — 44	Stiff	7½ — 8½	77	22	33½	"
6	Danish Island	July 31	95	44 — 46	"	8¼ — 8¾	75	10	34½	"
7	Golden Tartarian	Aug. 6	101	41 — 43	"	9 —10	75	10	30	Badly.
8	Pioneer (black)	July 26	90	41 — 43	"	7½ — 8½	74	24	33	"

OATS—TEST OF VARIETIES—*Concluded.*

Number.	Name of Variety.	Date of Ripening.	No. of Days maturing.	Length of Straw, including Head.	Character of Straw.	Length of Head.	Yield per Acre.		Weight per measured bushel after cleaning.	Rusted.
				Inches.		Inches.	Bush.	Lbs.	Lbs.	
9	Probstey	Aug. 1	97	47 — 49	Medium	7¼ — 8	74	24	34	Badly.
10	Fichtel Mountain	July 26	91	38 — 40	"	7 — 8	74	4	34½	"
11	Lincoln	" 31	96	45 — 47	Stiff	7¼ — 7¾	73	18	35	Considerably.
12	Abundance	Aug. 1	97	40 — 42	"	7½ — 8½	72	32	31	Badly.
13	Welcome	July 30	94	44 — 46	Medium	7 — 8	72	32	35	"
14	Twentieth Century	" 27	92	44 — 46	Stiff	7 — 8	72	32	36	"
15	Kirsche	" 31	95	40 — 42	Medium	7½ — 8½	72	32	35	Considerably.
16	Mennonite	" 26	91	38 — 40	Stiff	6 — 7	72	12	33	Badly.
17	Early Golden Prolific	Aug. 1	97	42 — 44	Medium	7½ — 8½	71	26	33½	Considerably.
18	Goldfinder	" 2	98	44 — 46	Stiff	7 — 8	71	26	32½	Badly.
19	Holstein Prolific	" 1	96	43 — 45	Medium	7 — 8	71	6	33½	"
20	Golden Beauty	July 30	94	44 — 46	Stiff	7½ — 8½	70	20	33	"
21	Thousand Dollar	" 26	91	42 — 44	"	6½ — 7½	70	20	35½	"
22	Bell (black)	Aug. 1	96	45 — 47	Weak	8 — 9	70	20	32	"
23	American Triumph	" 1	97	40 — 42	"	7 — 8	70	..	34	"
24	Dixon*	" 1	96	44 — 46	Medium	8 — 9	70	..	34¾	Considerably.
25	American Beauty	July 26	91	43 — 45	Stiff	7½ — 8½	69	14	35	"
26	Improved Ligowo	" 30	94	45 — 47	Medium	7½ — 8½	68	28	36	"
27	Black Beauty	" 31	95	41 — 43	"	7½ — 8½	68	28	31	Badly.
28	Whiting	" 30	94	41 — 43	"	7 — 8	68	28	35	Considerably.
29	Waverley	" 30	94	42 — 44	"	7½ — 8¼	68	8	34¾	"
30	Virginia White Abundance	Aug. 1	97	40 — 42	Stiff	7½ — 8½	68	8	36	Badly.
31	Excelsior (black)	July 25	89	41 — 43	"	7¾ — 8½	68	8	34	Considerably.
32	Milford White*	" 30	94	39 — 41	"	7 — 8	68	8	32½	Badly.
33	Gold Rain	Aug. 1	96	42 — 44	Stiff	8 — 8¾	68	8	35½	Badly.
34	Irish Victor	July 30	95	47 — 49	Medium	8 — 8¾	67	22	32	"
35	Kendal Black*	Aug. 1	96	38 — 40	Stiff	7½ — 8½	67	22	33	Considerably.
36	Olive Black*	" 1	96	40 — 42	"	8 — 8¾	67	22	35	Badly.
37	Wide Awake	July 31	95	42 — 44	"	6¾ — 7½	67	2	35	"
38	Swedish Select	" 30	94	45 — 47	Medium	7 — 8	67	2	35	"
39	Scotch Potato	Aug. 1	96	39 — 41	Stiff	8 — 9	67	2	34	"
40	Green Russian	July 26	91	40 — 42	"	7 — 8	67	2	31	Considerably.
41	Golden Fleece	" 31	96	43 — 45	Medium	7½ — 8½	67	2	32½	"
42	Tartar King	" 26	91	42 — 44	Stiff	8 — 9	65	30	32½	Badly.
43	Forbes*	Aug. 7	103	42 — 44	"	9¼ — 10¼	65	30	28	"
44	Hazlett's Seizure	Jnly 31	96	38 — 40	"	7¾ — 8½	65	10	33	"
45	Atlantic	" 30	94	42 — 44	"	8 — 9	64	24	35½	Considerably,
46	Columbus	" 30	95	44 — 46	Weak	7¾ — 8¼	64	4	32	Badly.
47	Joanette (black)	Aug. 1	96	34 — 36	Stiff	6½ — 7½	63	18	33½	Considerably.
48	Siberian	July 30	94	40 — 42	"	8 — 9	62	32	34	Badly.
49	Bestehorn's Abundance	Aug. 1	97	40 — 42	"	7½ — 8½	62	32	32½	"
50	Big Four	" 2	97	42 — 44	"	7½ — 8½	62	32	32	Considerably.
51	Daubeney	July 19	84	37 — 39	"	5¾ — 6½	62	32	32½	"
52	Great Northern	Aug. 1	97	39 — 41	Medium	7¼ — 7¾	62	32	35	"
53	Kendal White*	July 31	95	41 — 43	Stiff	6¾ — 7½	62	32	34	Badly.
54	Sorgenfrei	" 27	91	36 — 38	"	6½ — 7½	62	12	35¼	Considerably.
55	Buckbee's Illinois	" 30	94	42 — 44	Medium	7 — 8	62	12	39	Badly.
56	Milford Black*	" 31	95	46 — 48	Stiff	8 — 9	61	26	36½	"
57	Storm King	" 31	95	47 — 49	Weak	8 — 9	61	26	33½	"
58	Garton's Abundance	Aug. 1	97	40 — 42	Stiff	7½ — 8½	60	..	35½	"
59	Swedish Ligowo	July 27	91	44 — 46	"	6½ — 7½	60	..	37½	"
60	Dinauer	" 31	96	41 — 43	"	7½ — 8½	58	8	32½	"
61	Colossal	" 27	92	48 — 50	"	8 — 9	54	4	28	"
62	Early Angus	Aug. 7	102	45 — 47	"	9½ — 10½	54	4	34	"
63	Sensation	July 31	95	42 — 44	"	7 — 8	52	32	36	Considerably.
64	Golden Giant	Aug. 7	103	38 — 40	"	8 — 9	52	12	28	Badly.
65	Tlola	July 20	84	41 — 43	Medium	7¾ — 8½	49	14	31	Considerably.
66	Anderbecker	" 31	95	42 — 44	Stiff	6½ — 7½	49	14	35¾	"
67	Chinese Naked	" 30	94	43 — 45	Medium	7½ — 8½	45	10	45½	Badly.

Most Productive Varieties of Oats.—Among the most productive varieties of oats grown for the past five years at this Farm the following white varieties deserve special notice:—Banner, White Giant, Lincoln, and Virginia White Abundance. Among the mixed sorts (white and yellow), Uberfluss and Holstein Prolific have given large returns. The most productive of the pure yellow oats have been Mennonite and Columbus. The most productive black oat has been Black Beauty.

Earliest Varieties of Oats.—Among the earliest varieties of oats should be mentioned Tartar King, Welcome and Daubeney. These are all white oats and give a fair crop, but farmers are advised not to grow them except in cases where earliness is of very great importance. The white oats mentioned in the preceding paragraph will generally be found more profitable.

SIX-ROW BARLEY.

The *Mandscheuri* barley introduced into the plots this year is a strain obtained from Prof. Zavitz, of the Ontario Agricultural College. Mandscheuri and Mensury are probably different strains derived from the same original Manchurian barley. While it is to be regretted that such remarkable names are in use, we must accept them as they are. The two strains of this barley were grown side by side this year, and are being carefully compared to determine, especially, which of them gives the larger average yield in the climate of Ottawa. The results of the present season are very striking, but, of course, a single test cannot be considered here as conclusive.

The plots were all one-fortieth of an acre. The seed was sown on April 26, at the rate of 1¾ bushels to the acre. An unusually heavy crop was obtained. The soil was a clay loam.

The yield per acre is expressed in 'bushels' of 48 pounds.

* Varieties produced at the Central Experimental Farm are marked with an asterisk.

SIX-ROW BARLEY—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.		No. of Days Maturing.	Length of Straw, including Head.	Character of Straw.	Length of Head.	Yield per Acre.		Weight per measured bushel after cleaning.	Rusted.
					Inches.		Inches.	Bush.	Lbs.	Lbs.	
1	Nugent*	July	24	89	42 — 44	Stiff	2¾ — 3¼	72	24	46	Slightly.
2	Mensury	"	21	86	39 — 41	Medium	3 — 3½	71	12	46	"
3	Albert*	"	24	89	40 — 42	Weak	3¼ — 3¾	70	40	47½	"
4	Trooper*	"	22	87	41 — 43	Stiff	2¾ — 3¼	69	8	47	"
5	Oderbruch	"	24	89	43 — 45	"	2¾ — 3¼	68	16	46½	"
6	Odessa	"	21	86	42 — 44	Medium	3¼ — 3¾	66	12	46	"
7	Common	"	20	85	39 — 41	Weak	3 — 3½	65	20	49	"
8	Summit*	"	20	85	42 — 44	Medium	3¼ — 3¾	63	36	45½	"
9	Claude*	"	22	87	43 — 45	Weak	3 — 3½	62	24	47½	"
10	Brome *	"	24	89	38 — 40	Medium	2¾ — 3¼	61	12	48	"
11	Mandscheuri	"	23	88	42 — 44	"	3 — 3½	61	12	46	"
12	Black Japan	"	20	85	32 — 34	"	1¾ — 2¼	60	40	45	Considerably.
13	Silver King	"	21	86	40 — 42	"	3¼ — 3¾	58	36	47½	Slightly.
14	Escourgeon	"	23	88	39 — 41	Weak	2½ — 3	57	24	48½	"
15	Argyle*	"	24	89	43 — 45	Medium	2½ — 3	56	12	48	"
16	Stella*	"	24	89	44 — 46	Stiff	3 — 3½	55	20	47	"
17	Royal*	"	22	87	40 — 42	Medium	3 — 3½	54	28	46½	"
18.	Sisolsk	"	20	85	40 — 42	"	3 — 3½	51	32	47	"
19	Hulless Black	"	19	84	37 — 39	Weak	1½ — 2	50	..	62	Considerably.
20	Yale*	"	25	90	42 — 44	Stiff	2¾ — 3¼	49	28	48½	Slightly.
21	Mansfield*	"	24	89	41 — 43	"	2¾ — 3¼	46	32	46½	Considerably.
22	Bere	"	19	84	34 — 36	Medium	2½ — 3	45	40	48	Slightly,
23	Blue Long Head	"	24	89	36 — 38	"	2¼ — 2¾	43	36	40	Considerably.
24	Chinese Hulless	"	27	92	28 — 30	Weak	2 — 2½	43	36	58	"
25	Rennie's Improved	"	23	88	37 — 39	Stiff	2¼ — 2¾	43	16	49	Slightly.
26	Empire *	"	24	89	39 — 41	"	2½ — 3	42	4	47	Considerably.
27	Norwegian	"	21	86	41 — 43	Weak	2½ — 3	42	4	47½	Slightly.
28	Eclipse	"	27	92	43 — 45	Stiff	2¾ — 3¼	42	4	49	Considerably.
29	Champion (beardless)	"	19	84	45 — 47	"	3 — 3½	40	..	39	Slightly.

Most Productive Varieties of Six-Row Barley.—Taking the average of the returns for the last five years, the varieties of six-row barley found to be the most productive at this Farm are Stella, Odessa, Nugent, Mensury and Blue Long Head.

Earliest Varieties of Six-Row Barley.—The differences in earliness to be observed among the varieties of six-row barley are not very striking. Among the earliest sorts are Odessa and Mensury.

Beardless Six-Row Barley.—The tests carried on at this farm indicate that Champion is the best variety of beardless barley that has been grown here. It ripens early but gives a poor yield and is not to be recommended.

Hulless Six-Row Barley.—The most productive variety of hulless barley which has been tested at this farm is Hulless Black. This is a bearded sort. It ripens early but has weak straw and gives a small yield.

TWO-ROW BARLEY.

Archer Chevalier is a strain of the well-known Chevalier barley. It was obtained from Ireland and was sown in the plots for the first time this year.

The plots of two-row barley were sown on April 25th, the seed being used at the rate of two bushels to the acre. The plots were one-fortieth of an acre. The soil varied from a light loam to a clay loam.

The yield per acre is expressed in 'bushels' of 48 pounds.

*Varieties produced at the Central Experimental Farm are marked with an asterisk.

TWO-ROW BARLEY—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.		No. of Days Maturing.	Length of Straw, including head	Character of Straw.	Length of Head.	Yield per Acre.		Weight per measured bushel after cleaning.	Rusted.
					Inches.		Inches.	Bush.	Lbs.	Lbs.	
1	Swan's Neck	July	22	88	38 to 40	Medium	2½ to 3	65	..	49½	Slightly.
2	Danish Chevalier	″	25	91	45 ″ 47	Stiff	3½ ″ 4	62	44	49	Considerably.
3	French Chevalier	″	25	91	44 ″ 46	″	3¼ ″ 3¾	60	..	51	Slightly.
4	Hannchen	″	24	90	33 ″ 35	″	3¼ ″ 3¾	58	16	50½	Considerably.
5	Fichtel Mountain	″	25	91	39 ″ 41	″	3½ ″ 4	56	12	50½	Slightly.
6	Standwell	″	27	93	37 ″ 39	″	2¾ ″ 3¼	54	8	49½	″
7	Bestehorn's Kaiser	″	31	97	41 ″ 43	Medium	2¾ ″ 3¼	53	36	48	″
8	Clifford*	″	26	92	47 ″ 49	Stiff	3¼ ″ 3¾	53	16	49½	″
9	Archer Chevalier	Aug.	1	98	34 ″ 36	Weak	3 ″ 3½	52	4	48	Considerably.
10	Swedish Chevalier	July	26	92	36 ″ 38	″	3 ″ 3½	50	40	47	Badly.
11	Harvey*	″	26	92	46 ″ 48	Medium	3½ ″ 4	50	..	50	Slightly.
12	Logan*	″	26	92	47 ″ 49	″	3¼ ″ 3¾	50	..	51	Considerably.
13	Primus	″	31	97	38 ″ 40	Stiff	2½ ″ 3	47	44	51	Slightly.
14	Beaver*	″	25	91	50 ″ 52	″	4 ″ 4½	47	24	49½	″
15	Jarvis*	″	25	91	50 ″ 52	″	4 ″ 4½	46	12	50¾	″
16	Princess	Aug.	1	98	35 ″ 37	Weak	3¼ ″ 3¾	45	20	46¾	Considerably.
17	Invincible	July	31	97	40 ″ 42	Medium	3 ″ 3½	45	..	48½	Slightly.
18	Maltster	″	31	97	40 ″ 42	Weak	3 ″ 3½	43	16	44½	Considerably.
19	Canadian Thorpe	″	31	97	41 ″ 43	Stiff	2¾ ″ 3¼	42	24	48½	Slightly.
20	Sidney*	″	27	93	44 ″ 46	″	3 ″ 3½	42	24	50	″
21	Princess Svalof	″	31	97	36 ″ 38	Weak	3 ″ 3½	42	24	45	Considerably.
22	Gordon*	″	27	93	45 ″ 47	Stiff	2½ ″ 3	41	12	49	″
23	Dunham*	″	27	93	44 ″ 46	″	3 ″ 3¾	40	40	49¾	″
24	Newton	″	31	97	39 ″ 41	Medium	2¾ ″ 3¼	33	16	49½	″
25	Brewer's Favourite	″	31	97	36 ″ 38	Stiff	3 ″ 3½	31	32	48	Slightly.

Most Productive Varieties of Two-row Barley.—Taking the average of the returns for the past five years, the varieties of two-row barley found to be the most productive at this Farm are: French Chevalier, Danish Chevalier and Canadian Thorpe. Other very productive sorts are Standwell, Beaver and Princess Svalof. The latter is, however, late in ripening.

Earliest Varieties of Two-row Barley.—The earliest variety among the more productive sorts tested for the past five years is Beaver. It ripens about two or three days before French Chevalier.

Beardless and Hulless Two-row Barley.—The varieties of beardless and hulless two-row barley which have been tested at this Farm are so deficient in strength of straw that it has not been thought necessary to grow them in the larger plots.

WINTER SIX-ROW BARLEY.

The variety of winter six-row barley known as Zero which was mentioned in the report for last year was tested again. A plot of one-fortieth of an acre was sown on September 8th, 1904. The soil was a clay loam. It made good growth in the autumn, stood the winter pretty well, and gave a fair yield of grain. It did not, however, produce nearly so large a crop as the best sorts of spring six-row barley, and did not ripen remarkably early. The date of ripening was July 22nd, and the yield per acre was 43 bushels 16 lbs.

PEAS.

The plots of peas were one-fortieth of an acre each. The soil was a sandy loam. The seed was sown on April 28th, at the rate of two or three bushels per acre, according to the size of the pea. A large crop was obtained.

Three varieties, Crown, Mummy and Paragon have been withdrawn from the plots, but will be re-introduced as soon as satisfactory strains of seed shall have been obtained.

The yield per acre is expressed in 'bushels' of 60 pounds.

PEAS—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No. of days Maturing.	Character of Growth.	Length of Straw.	Length of Pod.	Yield per Acre.		Weight per measured bushel after cleaning.
					In.	In.	Bush.	Lbs.	Lbs.
1	White Wonder	Aug 8..	102	Medium	26–30	2 -2½	48	40	62
2	Gregory*	" 15..	109	Strong..	65–69	2½-3	41	40	62½
3	German White	" 9..	103	" ..	64–68	2 -2¼	41	20	63¼
4	Canadian Beauty	" 10..	104	" ..	66–70	2¼-2¾	40	40	62
5	Golden Vine	" 10..	104	" ..	68–72	2 -2½	39	40	63
6	Picton*	" 12..	106	" ..	58–62	2¼-2½	39	..	63½
7	Agnes*	" 12..	106	" .	66–70	2½-3	38	20	63½
8	Chancellor	" 12..	106	" .	66–70	1¾-2¼	38	20	63
9	Victoria*	" 18..	112	" ..	66–70	2¼-2¾	38	..	63¾
10	Pearl*	" 9..	103	" ..	64–68	2 -2½	37	20	62
11	Early Britain	" 15..	109	" ..	64–68	2 -2½	36	40	60½
12	Cooper*	" 10..	104	" ..	66–70	2¼-2¾	36	20	62
13	Prince*	" 9..	103	" ..	60–64	2¼-2¾	35	40	62
14	English Grey	" 16..	110	" ..	64–68	2 -2½	35	40	60¼
15	Duke*	" 15..	109	" ..	66–70	2¼-2¾	35	..	63
16	Mackay*	" 16..	110	" ..	64–68	2 -2½	34	..	63½
17	Prussian Blue	" 10..	104	" ..	62–66	2¼-2¾	34	..	63
18	Black-eye Marrowfat	" 18..	112	" ..	68–72	2¼-2¾	31	..	62½
19	Carleton*	" 15 .	109	" ..	68–72	2¼-2¾	30	..	63¾
20	Daniel O'Rourke	" 14..	108	" ..	70–74	1¾-2¼	29	40	64
21	Wisconsin Blue	" 10..	104	" ..	68–72	2 -2½	29	40	63½
22	White Marrowfat	" 15..	109	" ..	66–70	2¼-2¾	29	..	63
23	Arthur*	" 7..	101	Medium	50–54	2 -2½	27	40	63
24	Macoun*	" 14..	108	Strong..	70–74	2 -2½	27	..	63½
25	Kent*	" 15..	109	" ..	70–74	2¼-2¾	27	..	62½
26	Prince Albert	" 15..	109	" ..	66–70	2¼-2¾	25	20	61½
27	Archer*	" 16..	110	" ..	68–72	2 -2½	25	..	63
28	Field Grey	" 8..	112	" ..	68–72	1¾-2¼	24	40	63½
29	Nelson*	" 6..	100	Medium	47–51	2¼-2¾	22	40	62

* Varieties produced at the Central Experimental Farm are marked with an asterisk.

Most Productive Varieties of Peas.—Among the most productive sorts of peas grown for the past five years at this Farm are Golden Vine, Victoria, Mackay, White Wonder, Prince, Canadian Beauty and Prussian Blue.

Earliest Varieties of Peas.—Chancellor is perhaps the earliest ripening variety at this Farm. It ripens as a rule about four days before Golden Vine, and gives a good yield.

SPRING RYE.

One plot of spring rye (one-fortieth acre) was sown on April 26th, the seed being used at the rate of 1½ bushels to the acre. The soil was a clay loam. The grain was ripe August 1st (97 days). The straw was stiff, its length (including the head) being 56 to 58 inches. The heads were from 3 to 3½ inches long. The yield, expressed in 'bushels' of 56 lbs., was 40 bushels per acre; and the weight of the grain (after cleaning) was 56½ lbs. to the measured bushel.

WINTER RYE.

Four varieties of winter rye were sown on September 8th, 1904. The plots were one-fortieth of an acre, and the seed was used at the rate of 1½ bushels per acre. The soil was a clay loam. All the plots made good growth in the autumn, but in the spring the plots of Emerald and Giant were found to be rather badly winter-killed. These two varieties have been discontinued on account of their lack of hardiness.

The yield per acre is expressed in 'bushels' of 56 pounds.

WINTER RYE—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No. of days Maturing.	Length of Straw including Head.	Character of Straw.	Length of Head.	Yield per Acre.		Weight per measured bushel after cleaning.	Rusted.
				In.		In.	Bush.	Lbs.	Lbs.	
1	Mammoth White	July 21	316	62-64	Stiff	4-4¾	36	4	56	Considerably.
2	Thousandfold	" 24	319	70-72	"	4-4½	35	20	57	"
3	Emerald	" 26	321	54-56	"	4-4½	28	12	56	"
4	Giant	" 27	322	54-56	"	4-4¾	28	12	56	"

GRAIN SOWN IN DIFFERENT QUANTITIES PER ACRE ON SANDY LOAM.

These experiments were all conducted on plots of one-fortieth of an acre each. The wheat was sown April 29th and was ripe August 8th. The oats were sown April 29th and were ripe August 3rd. The barley was sown April 29th and was ripe July 22nd.

Though these tests have now been carried on for five years the results appear somewhat contradictory and do not yet permit the drawing of definite conclusions. The yields obtained this season are here given:—

Name of Variety.	Quantity Sown per Acre.	Number of Days from Sowing to Harvesting.	Yield per Acre.	
	Bush.		Bush.	Lbs.
Preston Wheat	1	101	32	20
"	1¼	101	31	20
"	1½	101	25	..
"	2	101	28	40
"	2½	101	26	40
"	3	101	27	..
Banner Oats	1½	96	45	30
"	2	96	72	32
"	2½	96	56	16
"	3	96	64	24
"	3½	96	77	2
"	4	96	64	24
Mensury Barley	1½	84	32	24
"	2	84	37	44
"	2½	84	28	36
"	3	84	35	20
"	3½	84	53	36
"	4	84	50	..

GRAIN SOWN IN DIFFERENT QUANTITIES PER ACRE ON CLAY LOAM.

These experiments were all conducted on plots of one-fortieth of an acre each. The wheat was sown April 28th and was ripe August 7th. The oats were sown April 28th and were ripe August 2nd. The barley was sown April 28th and was ripe July 22nd.

The results obtained this season are here given:—

Name of Variety.	Quantity Sown per Acre.	Number of Days from Sowing to Harvesting.	Yield per Acre.	
	Bush.		Bush.	Lbs.
Preston Wheat	1	101	25	..
"	1¼	101	32	..
"	1½	101	29	20
"	2	101	30	20
"	2½	101	32	..
"	3	101	30	40
Banner Oats	1½	96	80	20
"	2	96	82	12
"	2½	96	70	20
"	3	96	69	14
"	3½	96	75	10
"	4	96	83	18
Mensury Barley	1½	85	62	24
"	2	85	56	32
"	2½	85	46	32
"	3	85	37	4
"	3½	85	49	8
"	4	85	53	36

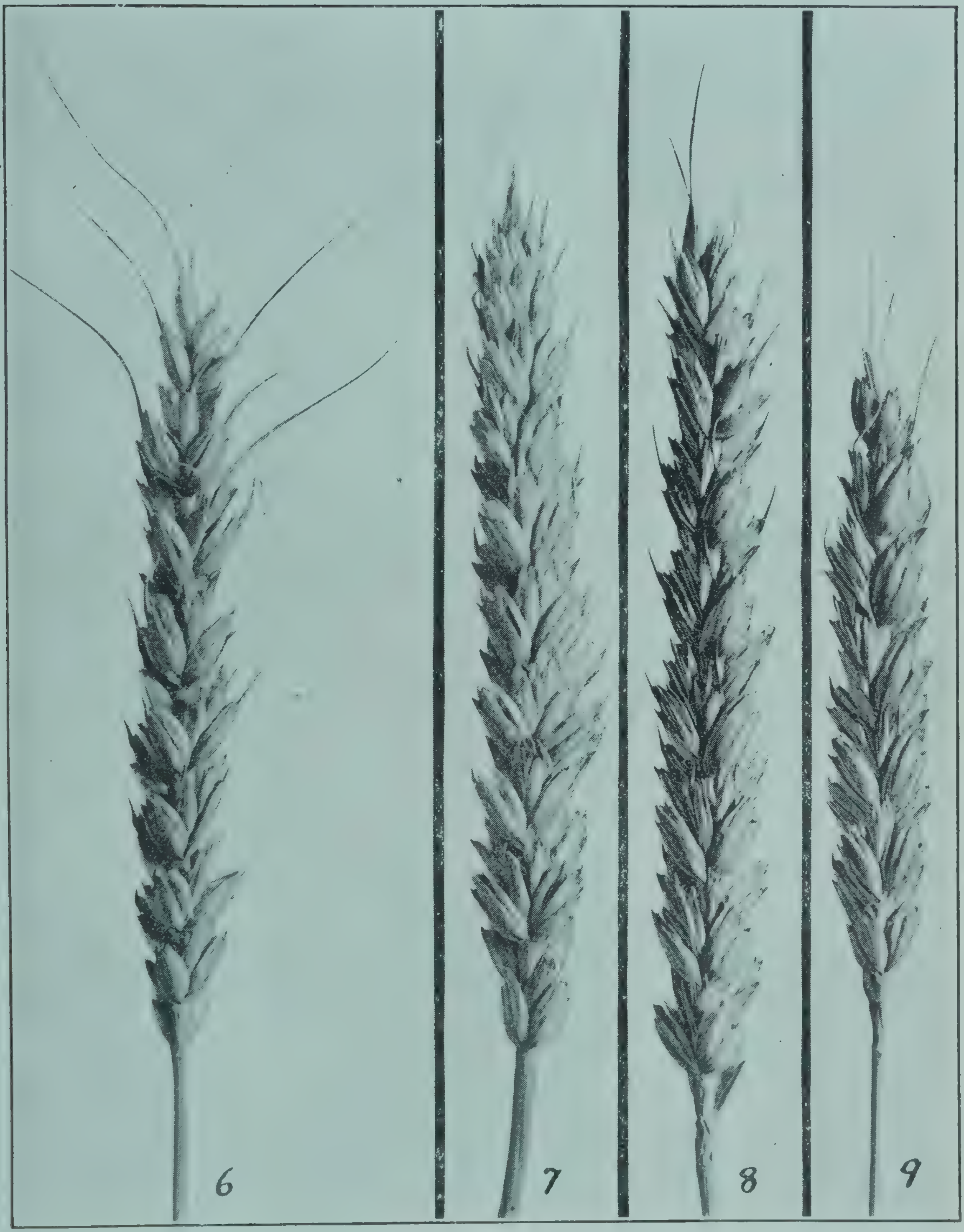


Photo. by C. E. Saunders.

6 and 7 are unusual Heads of Red Fife, (Actual Size.)
8 is a typical Head of White Russian, (Actual Size.)
9 is a small Head of White Russian (Easily mistaken for Red Fife).

Taking the average results for the five years during which these experiments have been carried on we find that the best quantity of Preston wheat to sow on clay loam is 1½ bushels to the acre, either a smaller or a larger amount of seed giving a reduced yield.

1¼ bushels per acre gave an average yield of 27 bushels 44 lbs. per acre.
1½ bushels per acre gave an average yield of 28 bushels 48 lbs. per acre.
2 bushels per acre gave an average yield of 27 bushels per acre.

The other quantities of seed used also gave smaller returns than were obtained from 1½ bushels.

The results with Banner oats do not form a regular series and it is evident that further tests must be made.

While the average returns for Mensury barley are not free from irregularities they permit definite conclusions to be drawn. About two bushels per acre is the best quantity to sow on clay loam.

1½ bushels per acre gave an average yield of 53 bushels 19 lbs. per acre.
2 bushels per acre gave an average yield of 54 bushels 39 lbs. per acre.

The larger quantities of seed sown gave somewhat smaller returns than those obtained from 2 bushels per acre. In addition to the reduced yield the extra cost of the larger amounts of seed must also be considered.

PLOTS OF MIXED GRAIN.

In choosing the varieties for these plots the greatest care is exercised to sow together only such sorts as are known to mature in almost the same number of days, so that they may both be ready for cutting at the same time. Only one column is given for the number of days maturing, as in every case the mixtures ripened with great uniformity.

The plots were one-fortieth of an acre and the seed was sown on April 26th. Wheat was used at the rate of 60 lbs. per acre, oats 40 lbs. per acre, barley 50 lbs. per acre, and emmer 70 lbs. per acre. The soil was a clay loam.

Varieties.	Date of Ripening.	No. of Days Maturing.	Yield per Acre.	Proportions in Crop Harvested.
			Lbs.	
Wheat and Oats—				
Pringle's Champlain wheat and American Triumph oats	Aug. 1	97	2,580	37 per cent wheat = 955 lbs. per acre. 63 " oats = 1,625 "
Preston wheat and White Giant oats	" 1	97	2,500	39 " wheat = 975 " 61 " oats = 1,525 "
Wheat and Two-row Barley—				
Gehun wheat and French Chevalier barley	July 29	94	2,060	40 " wheat = 824 " 60 " barley = 1,236 "
Oats and Two-row Barley—				
American Beauty oats and Princess Svalof barley	" 30	95	2,740	53 " oats = 1,452 " 47 " barley = 1,288 "
Welcome oats and French Chevalier barley	" 30	95	2,560	42 " oats = 1,075 " 58 " barley = 1,485 "
Oats and Emmer—				
Banner oats and common emmer	Aug. 2	98	2,560	76 " oats = 1,946 " 24 " emmer = 614 "

SOJA BEANS.

Two plots of the common soja bean were sown on May 25th and were cut on October 6th. The size of the plots was one-fortieth of an acre. The soil was a sandy loam. As the beans did not ripen the weight of green crop only was determined.

Plot 1.—Sown in rows 21 inches apart; growth strong and even, leafy; average height 43 to 45 inches; total yield of green crop 9 tons 1,600 lbs. per acre.

Plot 2.—Sown in rows 28 inches apart; growth strong and even, leafy; average height 45 to 47 inches; stalks considerably stiffer than in plot 1; total yield of green crop 10 tons 800 lbs. per acre.

The returns this year agree with those of previous years, showing a decided advantage in sowing the beans in rows 28 inches apart rather than 21. Taking the average of the results for the past five years the plots in which the rows of beans were 28 inches apart gave a yield of 11 tons 1,000 lbs. per acre, while those in which the rows were 21 inches apart gave 10 tons 744 lbs.

FIELD BEANS.

Four plots of field beans, one-fortieth of an acre each, were sown on May 26th. The soil was a loam of good quality.

The yield per acre is expressed in 'bushels' of 60 lbs.

FIELD BEANS—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Length of Pod.	Yield per Acre.		Weight per Measured Bushel after Cleaning.
				Inches.	Inches.	Bus.	Lbs.	Lbs.
1	California Pea Bean	Sept. 12..	109	18–22	3½–4	42	20	64¾
2	White Field	" 21..	118	20–24	4 –4½	32	20	64
3	Marrowfat	" 23..	120	24–28	3¾–4¼	27	20	63
4	Norwegian Brown	Aug. 29..	95	9–13	4¼–4¾	27	..	60¼

FLAX.

The plots of flax were one-fortieth of an acre. The seed was sown on May 25th, at the rate of 60 lbs. to the acre. The soil was a loam of good quality. The yield per acre is expressed in 'bushels' of 56 lbs.

FLAX—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Plants.	Weight of Seed per Measured Bushel.	Yield per Acre.	
				Inches.	Lbs.	Bush.	Lbs.
1	Riga	Aug. 18..	85	31–33	54	10	40
2	Russian	" 17..	84	35–37	53	9	30
3	Novarossick	" 29..	96	32–34	52	9	10
4	White Flowering	" 18..	85	31–33	54¼	8	..
5	Yellow Seed	" 22..	89	34–36	52	7	10
6	Common	" 18..	85	34–36	53½	4	20
7	La Plata	" 31..	98	31–33	52	4	..

MILLET.

The plots of millet were one-fortieth of an acre. The soil was a good rich loam. The seed was sown with a hand seed drill on May 12th. The plots were cut when the seed was in the doughy state.

MILLET—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Cutting.	Length of Straw.	Character of Growth.	Weight per Acre, Green.		Weight per Acre, Dry.	
			Inches.		Tons.	Lbs.	Tons.	Lbs.
1	Italian or Indian	Aug. 19..	59–63	Strong....	14	1,840	6	1,360
2	Pearl or Cat-tail	" 19..	50–54	"	14	160	8	1,040
3	African	" 19..	70–74	"	13	480	7	1,120
4	Green Californian	" 19..	43–47	"	11	..	6	240
5	White Round French	" 19..	60–64	"	10	1,280	5	1,200
6	Moha Hungarian	" 19..	48–52	"	8	1,200	4	1,680

FIELD ROOTS.

The advantage of late pulling for field roots having been clearly proved by the experience of several years, comparative tests, by pulling on two different dates about two weeks apart, were discontinued this season. All the roots were harvested at the one time, but the harvesting was left until quite late so as to enable the roots to make as large a growth as possible.

The yield per acre of the field roots is calculated from the weight of the crop gathered from one-hundredth of an acre.

The soil on which the field roots were grown was a good rich loam.

It is probable that in some instances varieties which are mentioned in these tables under different names are identical in all essential respects.

In Canada the ton contains 2,000 pounds.

TURNIPS.

Two sowings were made of each variety, the first on May 10th and the second on May 23rd. The seed was used at the rate of about four pounds per acre. Before sowing, the land was made up in drills two feet apart and rolled with a heavy land roller, which flattened the drills nearly one-half, leaving a firm seed bed. When the young plants were about three inches high they were thinned out, leaving them about seven inches apart in the rows.

The roots were pulled on October 25th.

TURNIPS—TEST OF VARIETIES.

Number.	Name of Variety.	Yield per Acre from 1st Sowing.		Yield per Acre from 2nd Sowing.	
		Tons.	Lbs.	Tons.	Lbs.
1	Perfection Swede	36	500	19	400
2	New Century	34	1,900	19	1,200
3	Jumbo	34	1,100	18	100
4	Kangaroo	34	800	20	200
5	Mammoth Clyde	33	1,700	16	1,500
6	Emperor Swede	32	1,400	15	1,300
7	Hartley's Bronze	32	1,300	17	1,600
8	Sutton's Champion	31	1,400	17	300
9	Magnum Bonum	31	500	23	1,500
10	Selected Purple Top	30	1,900	14	1,200
11	Carter's Elephant	30	1,600	15	700
12	Good Luck	29	1,700	16	100
13	Elephant's Master	29	1,000	11	300
14	Halewood's Bronze Top	29	600	14	600
15	Skirvings	28	1,700	11	100
16	East Lothian	27	1,300	13	900
17	Hall's Westbury	27	1,100	14	600
18	Bangholm Selected	26	1,100	10	1,700
19	Drummond Purple Top	24	400	13	..
20	Imperial Swede	23	200	16	750

The average yield from the 1st sowing was 30 tons 1,060 lbs. per acre.
The average yield from the 2nd sowing was 15 tons 1,852 lbs. per acre.

MANGELS.

Two sowings were made of each variety, the first on May 10th, and the second on May 23rd. The seed was used at the rate of about six pounds per acre. Before sowing, the land was made up in drills two feet apart and rolled with a heavy land roller to make a firm seed bed. When the young plants were about three inches high they were thinned out, leaving them about seven inches apart in the rows. The roots were pulled October 25th.

MANGELS—TEST OF VARIETIES.

Number.	Name of Variety.	Yield per acre from 1st sowing.		Yield per acre from 2nd sowing.	
		Tons.	Lbs.	Tons.	Lbs.
1	Half Long Sugar White	52	600	32	800
2	Prize Mammoth Long Red	46	700	25	1,500
3	Mammoth Yellow Intermediate	45	950	27	....
4	Prize Winner Yellow Globe	45	200	30	1,100
5	Leviathan Long Red	40	1,400	25	300
6	Giant Yellow Intermediate	40	1,250	24	1,600
7	Giant Sugar Mangel	40	900	26	300
8	Lion Yellow Intermediate	39	600	23	800
9	Ideal	37	900	29	600
10	Giant Yellow Globe	37	800	27	700
11	Selected Yellow Globe	37	800	21	1,400
12	Mammoth Long Red	37	700	23	800
13	Half Long Sugar Rosy	36	....	22	1,950
14	Yellow Intermediate	35	1,300	27	400
15	Gate Post	35	....	31	....
16	Triumph Yellow Globe	29	500	28	1,500
17	Selected Mammoth Long Red	28	1,200	16	1,800

The average yield from the 1st sowing was 39 tons 165 lbs. per acre.
The average yield from the 2nd sowing was 26 tons 29 lbs. per acre.

CARROTS.

Two sowings were made of each variety, the first on May 10th, and the second on May 23rd. The seed was used at the rate of about six pounds per acre. Before sowing, the land was made up in drills two feet apart and rolled with a heavy land roller to make a firm seed bed. When the young plants were about three inches high they were thinned out, leaving them about five inches apart in the rows. The roots were pulled October 25th.

Carrots—Test of Varieties.

Number.	Name of Variety.	Yield per acre from 1st sowing.		Yield per acre from 2nd sowing.	
		Tons.	Lbs.	Tons.	Lbs.
1	Mammoth White Intermediate	32	500	19	300
2	Improved Short White	30	1,700	19	1,300
3	New White Intermediate	30	1,600	21	1,400
4	Giant White Vosges	30	600	17	1,000
5	Ontario Champion	28	1,000	21	500
6	Carter's Orange Giant	24	600	20	600
7	Early Gem	23	1,200	23	300
8	White Belgian	21	1,100	18	300
9	Long Yellow Stump Rooted	21	600	18	500
10	Kos Kirsches	19	1,600	13	600
11	Half Long Chantenay	14	200	11	1,300

The average yield from the 1st sowing was 25 tons 427 lbs. per acre.
The average yield from the 2nd sowing was 18 tons 1,100 lbs. per acre.

SUGAR BEETS.

Two sowings were made of each variety, the first on May 10th, and the second on May 23rd. The seed was used at the rate of about six pounds per acre. Before sowing, the land was made up in drills two feet apart and rolled with a heavy land roller to make a firm seed bed. When the young plants were about three inches high they were thinned out, leaving them about five inches apart in the rows. The roots were pulled on October 25th.

Though all the varieties mentioned here are commonly classed as sugar beets, it should be noted that the only ones recommended for use in the manufacture of sugar are Wanzleben, French Very Rich, and Vilmorin's Improved.

SUGAR BEETS—TEST OF VARIETIES.

Number.	Name of Variety.	Yield per acre from 1st sowing.		Yield per acre from 2nd sowing.	
		Tons.	Lbs.	Tons.	Lbs.
1	Danish Red Top	40	1,300	25	200
2	Danish Improved	38	1,900	25	1,500
3	Red Top Sugar	36	900	17	1,300
4	Improved Imperial	32	1,600	20	600
5	Royal Giant	29	600	24	1,500
6	French Very Rich	29	....	17	300
7	Vilmorin's Improved	26	900	15	1,500
8	Wanzleben	25	600	14	400

The average yield from the 1st sowing was 32 tons 725 lbs. per acre.
The average yield from the 2nd sowing was 20 tons 162 lbs. per acre.

INDIAN CORN.

The corn was sown with the seed drill in rows thirty-five inches apart, and was also sown in hills thirty-five inches apart each way. When the plants were about six inches high they were thinned out, leaving them from six to eight inches apart in the rows, and leaving four or five plants in each hill. The seed was sown May 22nd, and the corn was cut green for ensilage September 11th. The yield has been calculated from the weight of crop cut from two rows, each 66 feet long. The soil was a rather heavy loam.

For the making of ensilage the corn should be cut when the kernels are in the late milk or doughy stage; but the summer at Ottawa is not always warm enough to bring the later varieties to this state of maturity before it is necessary to cut the crop to avoid frost.

In Canada the ton contains 2,000 pounds.

INDIAN CORN—TEST OF VARIETIES.

Number.	Name of Variety.	Character of Growth.	Height.	Leafiness.	Condition when Cut.	Weight per Acre grown in Rows.		Weight per Acre grown in Hills.	
			Inches.			Tons.	Lbs.	Tons.	Lbs.
1	Eureka	Very strong.	115 to 120	Leafy	Early milk	37	1,130	36	380
2	Pride of the North	Strong	100 " 105	Very leafy	"	33	1,650	31	700
3	Thoroughbred White Flint	"	100 " 105	"	"	33	880	35	180
4	Red Cob Ensilage	Very strong.	125 " 130	Medium	"	32	1,450	27	560
5	Cloud's Early Yellow	Strong	105 " 110	"	Late milk	32	1,340	27	340
6	Superior Fodder	"	115 " 120	Very leafy	No cobs	32	900	33	1,100
7	Wood's Northern Dent	"	110 " 115	"	Early milk	31	1,360	29	1,950
8	Longfellow	"	80 " 85	Leafy	Late milk	31	920	24	730
9	Selected Leaming	"	115 " 120	Very leafy	Early milk	31	700	26	1,900
10	King Philip	Medium	100 " 105	"	"	30	940	27	1,330
11	Early Mastodon	Strong	105 " 110	"	"	30	60	26	1,020
12	Giant Prolific Ensilage	"	110 " 115	"	No cobs	29	1,620	26	1,900
13	Salzer's All Gold	"	105 " 110	"	"	29	1,620	31	1,800
14	Evergreen Sugar	Medium	95 " 100	Leafy	Late milk	29	520	29	300
15	Early Butler	Very strong.	110 " 115	"	Early milk	28	1,750	29	1,620
16	Compton's Early	Strong	80 " 85	"	Late milk	28	1,310	25	710
17	Champion White Pearl,	Very strong.	110 " 115	Medium	Early milk	27	1,880	24	400
18	Angel of Midnight	Medium	95 " 100	Very leafy	Early milk	27	450	26	360
19	White Cap Yellow Dent	Strong	100 " 105	"	"	27	450	27	780
20	Mammoth Cuban	"	105 " 110	Leafy	"	26	1,900	27	1,550
21	North Dakota White	Medium	94 " 100	Very leafy	"	26	1,900	26	30

The average yield from the rows was 30 tons 987 lbs. per acre.
The average yield from the hills was 28 tons 1,221 lbs. per acre.

INDIAN CORN SOWN AT DIFFERENT DISTANCES.

Three varieties were chosen for this test: Champion White Pearl, Selected Leaming, and Longfellow. The seed was sown May 22nd, and the corn was cut for ensilage September 11th. Sixteen rows of each variety were sown, that is, four rows at each of the distances mentioned, and the yield per acre has been calculated from the weight of crop obtained from the two inner rows in each case. The length of the portions of the rows cut for weighing was 66 feet.

Name of Variety.	Distance between the Rows.	Character of Growth.	Height when Cut.	Condition when Cut.	Yield per Acre.	
	In.		In.		Tons.	Lbs.
Selected Leaming	21	Very strong.	95—100	Early milk	30	1,992
"	28	"	100—105	"	32	1,706
"	35	"	100—105	"	27	1,660
"	42	"	100—105	"	30	912
Champion White Pearl	21	"	110—115	"	29	590
" "	28	"	115—120	"	30	66
" "	35	"	115—120	"	32	900
" "	42	"	115—120	"	29	280
Longfellow	21	Medium	90—95	Late milk	26	1,676
"	28	"	95—100	"	24	504
"	35	"	95—100	"	27	340
"	42	"	95—100	"	27	1,736

FIELD PLOTS OF POTATOES.

As the experimental plots of field roots and fodder corn do not occupy the whole of the field in which they are placed, the remaining space is usually filled with potatoes, such varieties being grown as are likely to be of service in the annual distribution of samples from this Farm.

The area devoted to the different varieties varies considerably. This season the plots were from about one-quarter to three-quarters of an acre in size.

The potatoes were planted May 15th, and were dug September 29th.

In spite of repeated sprayings with Bordeaux mixture, those varieties which were grown in rather heavy soil were considerably affected by rot. The varieties grown in rather light soil were not much affected.

The yield per acre is expressed in 'bushels' of 60 lbs., and includes only the sound potatoes.

Number.	Varieties Grown in rather Light Soil.	Yield per Acre.
		Bushels.
1	Dr. Mærker	274
2	Early White Prize	241
3	Money Maker	225
4	Everett	217
5	Reeve's Rose	207
6	Rochester Rose	206
7	Burnaby Mammoth	182
8	Canadian Beauty	157
9	Late Puritan	140

Number.	Varieties Grown in rather Heavy Soil.	Yield per Acre.
		Bushels.
1	Swiss Snow Flake	202
2	Uncle Sam	166
3	American Wonder	162
4	Bovee	149
5	Carman No. 1	145
6	Vick's Extra Early	143
7	State of Maine	94

REPORT OF THE POULTRY MANAGER.

(A. G. GILBERT.)

OTTAWA, December 1, 1905.

To Dr. WM. SAUNDERS, C.M.G.,
Director Dominion Experimental Farms,
Ottawa.

SIR,—I have great pleasure in submitting to you the eighteenth annual report of the Poultry Division of the Central Experimental Farm.

Whether discussing some of the more recent phases of poultry development or giving detailed account of the experimental work carried on during the past year, there was always the intention of conveying to the farmers of the country and others interested such information as would be found of practical benefit to them.

With this object in view the first portion of the report is devoted to the consideration of certain changes which have lately taken place in the home market, the requirements of which, while they have become more exacting, have also become more valuable.

A number of extracts are quoted from letters written by farmers who not only show in these quotations large margins of profit made by them in catering, with poultry products of the best quality, to the more exacting demands referred to; but also describe their methods of management and the rations used by them in bringing about these profitable results.

The second part of the report gives detailed account of the experimental work of the year which, for the most part, was carried on under the immediate supervision of my assistant, Mr. Victor Fortier. To his careful and systematic recording of the *data* relating to the different experiments in combination with a thorough knowledge of the details of poultry breeding, much of the interesting experience gained is to be attributed.

I have pleasure in acknowledging the attention and correctness shown by Mr. Summers in securing results of the trap test, and other experiments entrusted to his care. Mr. George Deavey has been active and regular in the performance of the work allotted to him.

During the latter part of the season a small poultry house of new pattern with scratching shed attachment was erected and will be used in promoting the work of building up hardy and prolific winter egg laying strains of fowls.

Addresses were given by the writer during the year at different points throughout the country.

Mr. Fortier addressed meetings, or attended poultry shows at St. Therése, Cowansville, St. Hyacinthe, Three Rivers, Quebec City, Rivière du Loup and St. Justin, in the province of Quebec, and Ottawa, later in the year.

An exceedingly useful and instructive exhibition was made by our Division at the Central Canada Exhibition held during the second and third weeks of the month of September last. The display showed the methods adopted and appliances used in the prosecution of the work of our department as well as a number of birds of very fine type and quality, which received much appreciative comment.

The letters received during the year numbered 2,993, and those sent away, 3,043. Besides a large number of reports were despatched in response to requests for them.

For further particulars relating to the work of the past year, I beg to refer you to the following report.

I have the honour to be, sir,
Your obedient servant,
A. G. GILBERT.

REPORT OF THE POULTRY DIVISION.

There are certain features in connection with the work carried on by this Division during the past year that warrant more than passing notice. A brief discussion of these features, which not only mark distinct advance in the poultry branch of farm work but directly affect the production and consumption of poultry and eggs, will doubtless be of interest to producers, purveyors and consumers. Among the subjects considered are:

1. Continued high prices for midsummer eggs, but which must be strictly new laid.
2. Decreased exports notwithstanding increased production.
3. Has the cost of production kept pace with increased prices?
5. Is the home production of the better quality of poultry and eggs equal to our local demands?
6. Some difficulties in the way of placing strictly new laid eggs and the desirable type of chickens on the market.
7. Letters from farmers showing large margins of profit made by the sale of reliable eggs and the superior quality of poultry.

A marked feature of the year was the greatly increased demand from all parts of the country, but chiefly from farmers, for information as to the most suitable breeds of poultry and their proper management, and for the fowls themselves for laying, market or breeding purposes, far beyond the capacity of our department to supply.

While these are all gratifying instances of growing interest in this branch of farm work, that there is great room for further development is proved by the fact that the supply of the better quality of poultry and eggs is yet far short of the demands of the home and British markets. Another sign of the rapidly growing value of our home market is the continued high value of eggs laid in the midsummer months. To find a reason for these high prices is the subject of much speculation among those who cannot see why summer eggs should be worth more now than heretofore.

CAUSES OF THE HIGH PRICE OF SUMMER EGGS.

One likely reason for the continued high price of midsummer eggs was said in report of last year, 1904, to be the more general practice on the part of farmers and poultry fanciers of having their fowls moult in summer. As the moulting period is one of comparative non-production and usually occupies from 8 to 10 weeks, its effect on the heretofore large midsummer egg supply, will readily be appreciated. More recent investigation shows another likely cause for the midsummer shortage of eggs to be the practice on the part of dealers or their agents of purchasing during the summer months from farmers or village storekeepers large numbers of eggs for the purpose of preservation in cold storage or by other means.

These eggs are purchased at the lowest price and held over for sale in the city markets when values are at their highest.

WHY SHOULD EXPORTS OF POULTRY AND EGGS DECREASE IN THE FACE OF INCREASED PRODUCTION?

As compared with the exports of poultry and eggs for the year 1904, amounting to $1,250,197, those of the succeeding year 1905, valued at $858,289, show a considerable falling off. The first inclination on reading these figures would be to attribute the decline in value to a lessened demand on the part of the English consumers. But the reverse is actually the case, for Canadian poultry and eggs were never in greater request or better repute than they are at present. What then is the cause of the decrease in the export value of these articles? This question is frequently asked. There is an explanation therefor. Close observation of and experience in the different phases of poultry and egg production suggest the following influences as likely to have brought about the present state of affairs, viz.:—

1. Increased home consumption with increased prices.
2. The higher price of meat which has resulted in a greater consumption of eggs.
3. A greater and growing appreciation of the better class of poultry and eggs which can only come from carefully reared chickens and cleanly fed hens.
4. The extra care and effort required in obtaining the 'selected' article, which as a result is calculated to be in lesser than greater supply.
5. A popular opinion that there is less waste in a dozen eggs even at advanced prices than there is in meat of the same value.
6. The convenience and despatch with which eggs may be prepared as food under many varied conditions.

HAS THE COST OF PRODUCTION INCREASED WITH ENHANCED VALUES?

This is another question that frequently occurs in connection with the increased values of poultry and eggs. In reply it may be said that experience tends to show that there should be lessened rather than increased cost of production to the different classes of producers, who are acquainted with up to date poultry management and in this way:—

To the farmers of the country in the more general use of many forms of waste, convenient to them, and which hitherto may have been unthought of or neglected factors as applied to poultry keeping. Among these forms of waste may be classed refuse of table and kitchen; unmarketable roots or vegetables; small grains which may be ground up and made into mash; chaff or short straw or hay, which can be used for litter or scratching material on the floor of the pens, heads, livers or other forms of meat waste; skimmed milk, curd, whey, &c., which can be used to good purpose in the fleshing of chickens and in egg production; and farmers have their grain at cost.

To specialists and other poultrymen, many of the aforementioned forms of waste will doubtless be available, as well as numerous preparations of meat, meals and clover —the by-products of farm, factory and packing house. These and other preparations of grit, and broken oyster shells are put up in convenient packages and sold at reasonable prices by poultry supply houses, or their agents throughout the country.

Until recent years the use of these essentials was little understood nor were they easy to procure, but the development of poultry keeping created a demand for them and in response the supply came.

The better appreciation and more general use of these varied forms of waste and by-products—so long as the latter are cheap and effective—should tend to prevent an increase in the cost of production, if not to actually lessen it.

HAS THE PRODUCTION OF THE BETTER QUALITY OF POULTRY AND EGGS KEPT PACE WITH THE HOME DEMAND?

This is a question that is the subject of much interesting speculation. It is one that presents itself in connection with the growing value of the home market for the better quality of poultry and eggs. Increasing prices show that the supply is yet short of the demand. There can be no doubt that the home requirement for both these products is far greater to-day than ever before and equally true is it that the taste of our home consumers for the better quality was never more exacting than it is to-day. This is instanced in the increased demand in summer for the 'strictly new laid egg' with the flavour peculiar to it. The leading purveyors of the cities do not hesitate to say that their customers are no longer content with the vague assurance 'that the eggs are probably fresh.' If after they are bought the eggs turn out to be bad the seller is sure to hear about it. So the city or town grocers, like their customers, become more exacting, and the farmers or collectors in turn have to be more cautious as to the freshness of the eggs and quality of the poultry they sell.

Perhaps the exacting nature of these demands is a cause for the apparent difficulty in meeting them. It has already been remarked that 'increased care and effort' are required to produce the 'selected' article. This at once means higher value for the greater labour expended. Certain it is that these are causes for the comparatively slow response on part of producers to remunerative margins of profit. These profits are shown in a later page by the farmers who made them by catering to the 'exacting' demands referred to with high class products. Long experience has shown that there are certain conditions which govern the production of the high priced article. These conditions must be unflinchingly observed by farmer, amateur, or professional manager of a poultry plant before they can place the 'selected' or 'guaranteed' eggs and plump chickens—which will bring the highest prices—into the hands of leading city purveyor or private customers. These conditions are named as follows:

CONDITIONS TO BE OBSERVED IN THE PRODUCTION OF 'SELECTED' EGGS AND POULTRY.

SUMMER EGGS of undoubted freshness and flavour must be—

(*a*) Strictly new laid when sent to city dealer or sold to private customer.

(*b*) They should reach the consumer within one week of being laid.

(*c*) Non-fertilized.

(*d*) After being taken from nests—until shipped or sold—should be kept in a sweet smelling cellar or cupboard.

WINTER EGGS—

(*a*) Should be collected before being frozen.

(*b*) Sent to city dealer, customer or sold on market within ten days of laying.

(*c*) Kept meanwhile in clean, sweet smelling storing place.

(*d*) Preferably non-fertilized, but this is not so strictly insisted on as in the case of summer eggs, for in winter there is not the same risk of germ development.

EGGS OF BOTH SEASONS.—In order to have the desirable flavour at all seasons eggs should come from cleanly fed and kept hens. The fowls should not have access to decaying animal, or, vegetable matter. This particularly applies to summer. The nests at all times should be clean, comfortable and free from lice. The largest eggs will be laid by hens. Pullets may yield a greater number but their eggs will be found to be of smaller size. Whether laid by hens or pullets the eggs to be of large size and good quality must come from generously fed birds.

POULTRY OF BEST QUALITY.—To have chickens of the desirable type and quality they require to be:—

(*a*) Of correct market type. This is brought about by breeding from parent stock of like type.

(*b*) They should be carefully housed and regularly fed from time of hatching until saleable age.

(*c*) They should not be expected to 'pick up all their own living.' This practice is too common. Chickens so treated or in any other way neglected are not likely to make good market specimens, breeding stock or show birds.

(*d*) Chickens, their coops and colony houses should be kept free from lice. Lice-infested chickens do not thrive.

(*e*) A thriving chicken should be a hearty eater, an industrious forager and quick grower.

The faithful observance of the foregoing conditions is likely to be followed by the best results in the rearing of the better class of table poultry and the obtaining of reliable eggs. The proper food and treatment for chickens will be found in a following page.

APPRECIATION OF THE BETTER QUALITY.

Farmers and others who contemplate going into poultry and egg production will find it to their advantage to correctly size up the requirements of the present day markets. They should, from the outset, make it a rule to produce none but the best quality of poultry and eggs. That the better quality receives the highest price is shown in the following letters from farmers, their wives or daughters:—

PETROLEA, November 20, 1905.

DEAR SIR,—I am offered by Mr. Gatehouse, of Dorchester street, Montreal, to whom you referred me, the following prices:

Eight to 10 cents per lb. for ordinary farm chickens; 10 to 14 cents per lb. for fattened chickens *according to quality.*

Fresh eggs 40 cents per dozen, with the prospects of an advance in a few days. I received his letter a week ago (November 13).

The poultry prices I did not consider high enough to tempt me to ship. Eggs at prices named would pay me well. As a result I may keep one hundred pure bred hens. Those I have are mixed.—HATTIE E. S.———.

In reply, the above correspondent was advised to carry out her intention of keeping none but pure bred Plymouth Rocks, which would not only give her eggs, but chickens of the most acceptable market types. In this way she would have opportunity to receive the highest values for both articles.

The following is an instance where the best quality poultry, properly plucked and dressed, received the highest prices:

MYRTLE, ONT., October 23, 1905.

DEAR SIR,—We sent our poultry to Mr. H. Gatehouse, Dorchester street, Montreal, and received the following prices for them: Barred Plymouth Rock cockerels (dressed) 15 cents per lb. Ducks—Pekin and Rouen—of large size and good quality, 16 cents per lb.

It cost one cent per lb. for express charges to Montreal. The cockerels were dressed in the same manner as were the poultry shown by the Central Experimental Farm at the Central Canada Exhibition in Ottawa last month (September). They were plucked but not drawn, with feathers on wing tips, and their heads placed under their wings. We send all our poultry to Mr. Gatehouse.—(Sgd.) MRS. F. LEA.

The following is another instance of the better quality receiving best prices:

ELMHURST, RAMSAY, November 14, 1905.

DEAR SIR,—In July last I sold April hatched chickens at 20 cents per lb. In August the May chicks at 16 cents per lb. Live weight in both cases. Up to this date I have sold 90 cockerels.—MRS. JOS. YUILL.

MARGINS OF PROFIT MADE BY FARMERS. INSTANCES OF SUCCESSFUL MANAGEMENT.

The question as to possible margins of profit in poultry keeping is frequently asked. For many years past it has been the contention of enthusiastic advocates of poultry culture that, when properly managed, no branch of farm work should pay a better margin of profit. In reports of this department for many years past it has been held that, by obtaining eggs in winter and selling them at city prices, in combination with the rearing of the best types of market chickens in early summer, a margin of from one to two hundred per cent profit should be made by farmers, according to their near location to or distance from a city market. That these calculations, made after long experience, were not over-estimated is shown by the following instances of successful poultry management, and related by farmers over their own signatures, in leading agricultural papers of recent date. These statements are doubly valuable for they not only show large margins of profit, but the methods of feeding and management whereby they were made:—

STATEMENT 1.—Made by Mr. J. R. Henry, of Wentworth County, in *Farmers' Advocate* of March 9, 1905: 'Have had eggs all fall and winter in good supply. Have kept account, and have sold more than $2 worth of eggs for every $1 worth of feed consumed. And in growing early chicks for market, have made $3 for $1 cost. I find I can raise chicks to eight weeks for $8 per hundred, and make them ready for market. Yes, my hens pay and pay well.

'In feeding, I try to follow, in part, Ottawa Experimental Farm teachings. Morning, first thing, a little tasty mash, but not more than a pint to twenty-five hens. Then stir up the litter, and scatter a half pint of screenings; this again at noon. Open up the windows and doors, unless storm beats in. During day, clover leaves in trough, also apples and apple peelings. I like to hang cabbage and mangels for them to pick at high enough that they have to reach or jump for them. I think it best to feed the green bone or other animal food about two hours before sundown each day, about one-half ounce to each hen. Then give a final feed of grain in the straw, about two quarts to twenty-five hens. Then, at sundown give a mash composed of cooked potatoes and peelings, with any kitchen scraps, with chop and shorts stirred in until stiff—all they will eat. Water, grit and oyster-shell at will. I think wheat the best all-round grain, if we were compelled to use only one kind. Always, when wheat is high, eggs are dear also, so we can draw a safe conclusion.'

STATEMENT No. 2.—By Mr. J. F. Riddle, of Norfolk Co., Ont., in the *Farmers' Advocate* of March 2, 1905, and which shows a large margin of profit from his hens and his manner of feeding them, viz.:—

'In the year 1903 I kept 40 females (Barred Plymouth Rocks) and they netted me $34 over and above the feed bill. In 1902 my sales amounted to $101.40, with net profit of $43.36. In 1901 receipts were $103.50, my profit being $52, but I cannot say how many I kept these two years.

'I have always fed a variety of grains—wheat and buckwheat forming the principal part—with very little corn or oats. I give one or two messes of cooked vegetables, mixed with shorts, each week, with cabbage or mangolds for a change. They get green-cut bone or liver two or three times a week; also clover leaves, either dry or in the mash. They get a warm mash nearly every day, either night and morning. I strive to keep them busy and contented the whole day long.

STATEMENT No. 3.—By Mr. E. C. Parker, Compton, Que., March 16, 1905.—An estimate of the profit to be made from selling eggs during the summer and winter months may fairly be had by calculating that it costs during summer 5 cents to produce a dozen eggs, which sell for 16 cents, a moderate value at that season. Allowing that it costs twice as much to produce a dozen eggs in winter, when they sell in Montreal at 35 to 50 cents per dozen, as I show later on, we still have a profit of from 25 to 35 cents per dozen. From 100 April and May hatched White Wyandottes (50 of each), I got $14.30 worth of eggs in November, 1903. In December of same year they laid 1,141 eggs. In January, 1904, they laid 1,385, about 115 dozen. In February they laid 1,393 eggs. The prices received per dozen were: November, 40c.; December, 50c.; January, first two weeks, 45c., last two weeks, 40c.; February, 40c. for the first three weeks, 35c. for the last week. The total amount received by me from Mr. Graham, of Montreal, was $149.41. This record is to March 1. My methods of management are and have been as follows:—By selecting the best I have now no poor egg layers. I keep 6 to 8 inches of straw on the floors of the pens, and change it about once per week. The whole grain is fed in the litter during the winter. Rations are:—

Morning (early).—Cracked corn.

About 11 a.m.—Mangels or cabbages.

Noon.—Wheat.

P.M. ration.—Mash composed of second crop clover hay (cut), bran, middlings, ground oats, cornmeal and a small part of meat meal.

Any spare skimmed milk is also given to the fowls. I am a great believer in fresh air, and my houses are open every fine day during winter, and as a result they are always dry, and I have few cases of sickness. I do not believe that hen's kept in the manner outlined, and if of a good egg-laying strain, get too fat to lay, so I feed them all they will eat up clean. I never could get hens to lay well unless they were fat and well fed.'

The last statement is most important, as the experience gained in our department in the winter feeding of the laying stock in cold quarters leads to the same conclusion.

Statement No. 4.—By Mrs. Joseph Yuill, of Ramsay, Ont., near Carleton Place. 'I never had such good results from my fowls as I have had during the past year. I have cleared $17 per month from 35 hens from December 1, 1904, to end of March last. This from eggs only.'

Statement No. 5—By Mr. John Nadeau, East Montmorenci, Que.: 'Last fall I began with 15 hens of different kinds. They were put into a poultry house 15 x 17, with a scratching shed attached 10 x 18. I fed as follows:—

'Morning Ration.—Warm mash composed of bran, ground oats and ground barley.

'Noon.—Oats and barley mixed. Sometimes buckwheat or wheat replaced the barley. This was thrown into the litter on the floor of the scratching shed to cause the hens to search for it.

Afternoon.—Oats and barley, or wheat or buckwheat mixed in lieu of the latter. This was always thrown into the litter. Every effort was made to keep the fowls busy.

'On May 2 last, I set three hens (old) on 39 eggs, and from them received 32 strong and vigorous chickens. I attribute the fertility of the eggs and the strength of the germs to the exercise, fresh air and plenty of room.

'Between the fall of last year and October 2 of this year (1905), I sold eggs and chickens which made me $26.79 above all expenses. This may seem a small amount of profit, but I have on hand 44 hens and a cockerel.'

EXPERIMENTAL WORK.

The experimental work of the year began in the latter part of October, 1904, when the following work—preliminary to the birds going into winter quarters—was performed, viz.:—

The pullets were removed from the cockerels into their future winter quarters. This was done for the reason that the pullets at this season are apt to be annoyed with the attentions of the more precocious cockerels—particularly those of the Mediterranean breeds.

The pullets were placed by themselves so that they could be better cared for and more generously fed in order to induce early laying. This method of treatment will be found decidedly beneficial.

Care was taken by judicious feeding to prevent the older hens from going into winter quarters over-fat, which they are likely to become if heavily fed before beginning to lay again. To still further prevent any risk of becoming over-fat the hens were not kept in the same pens with pullets. Experience has shown that pullets will lay well and keep in good condition on rations which are likely to make older hens too fat.

COMMENCEMENT OF WINTER LAYING.

The fowls were well over their moult and in good condition when they went into winter quarters, towards the end of November. Winter laying commenced at the beginning of December. The first hens to lay were Barred Plymouth Rocks, Buff Orpingtons, Silver Grey Dorkings, Buff Leghorns and Silver Laced Wyandottes. Egg laying was fairly general by the third week of the month. As at a similar period during the previous year the weather was extremely cold, and new laid eggs were in limited supply and high in price, especially during the Christmas season.

BUILDING UP PROLIFIC EGG LAYING STRAINS OF FOWLS BY MEANS OF TRAP NESTS. DETAILS OF FIRST YEAR'S RESULTS.

In January, 1904, the work of building up prolific egg laying strains of fowls was commenced. There are two methods by which this purpose may be accomplished. One is by 'observation' of the birds, and the other by 'trap nests.'. The latter method was adopted as likely to prove most correct. The manner of operating the trap nests, may be described as follows: Each fowl, in the different laying pens, bears a number affixed to one of its legs. On entering a nest to lay the hen involuntarily releases a hinged door which falls and closes the exit and also prevents another fowl from making her way into the nest. After the hen in the nest has laid she is released by the attendant, who notes her number and marks it on a card conveniently situated in each pen. A complete history of each individual hen is so secured. The following tables show the results from the use of the trap nests for the first year and their value in making plain the good and bad qualities of the individual members of the laying pens. Additional information shows the composition and cost of the rations used, the value of the eggs sold and the profits made by each group of fowls.

TABLE 1.—Individual hen records shown by trap nests. 12 Barred Plymouth Rock hens, 3 years old. Pen 1.

FROM DECEMBER 1, 1904, TO NOVEMBER 1, 1905.

Hen No.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total of Eggs laid.	Remarks.
	1905											1904		
1	1	0	0	17	24	10	4	14	5	0	....	9	80	Broody and broken up twice during season.
19	0	0	23	19	16	13	7	4	3	0	...	0	85	" "
36	16	20	16	10	0	10	0	0	0	0	....	0	72	Used for setting from April 19 to May 12.
37	0	0	12	20	11	18	12	0	0	0	....	0	73	Broody twice during season, but broken up.
*41	0	1	15	14	0	0	0	0	0	0	....	0	30	Used for setting from Apl. 29 to July 1.
49	5	16	19	2	0	0	10	3	8	0	....	0	63	Setting from Apl. 7 to June 1.
62	2	10	0	16	....	...	....	....	....	....	....	0	28	Died April 28, '05.
*71	1	1	4	12	9	18	0	0	0	0	....	0	45	Broody once, but broken up.
80	11	19	24	17	0	0	17	6	10	19	....	0	125	Setting from Apl. 20 to July 3.
*86	7	5	1	3	8	1	0	0	0	0	....	0	25	Broody 3 times, but broken up.
*96	0	6	19	13	0	....	....	....	....	....	....	0	38	Died June 5, 1905.
100	0	1	20	17	21	7	0	0	0	0	....	0	66	Showed no inclination to set.
						1							1	This egg was laid in the straw on the floor of the pen.
Total.	43	77	158	159	89	78	50	23	26	19	....	9	731	

Photo. by F. T. Shutt.

1.—Chickens from Fowls kept in Unheated Houses with Scratching Shed attachment.
2.—Chickens from hardy strains. Colony House on the left ; Brooder on the right.
3.—Pullets and Cockerels from good egg laying fowls.

Hens marked * were the poorest layers, and were neither used for breeding stock in our department nor were they sold for a like purpose.

RATIONS.

The rations used in feeding the above fowls were of the following composition: Whole grain ½ wheat ½ oats mixed, 1½ lbs. to each pen per day. Mash (wet) 1 lb. per day, composed of 2 parts shorts, 1 part ground oats, 1 part ground barley. Grit and oyster shells in regular supply. No meat, bone or roots were given to the fowls in this pen.

EXPENDITURE AND RECEIPTS.

Value of grain consumed, 435 lbs. at 1¼c. lb	$5 44	
" mash consumed, 178 lbs. at 1c. per lb.	1 78	
" grit and shell consumed, 30 lbs.	0 25	
" 15 egg boxes for shipping at 8c. each.	1 20	
		$8 67

RECEIPTS.

Value of 506 eggs sold for eating	10 55	
" 15 settings of eggs of 15 each.	15 00	
		$25 55
or, $1.40⅔ per hen. Gain by this pen of.		$16 88

Eggs for eating purposes were sold during the year at the following prices, viz.:—Dec., 1904 and Jan., 1905, at 40c. per doz.; Feb., 35c.; March, 22c; April, May, June and July, 18c.; Aug., 20c.; Sept., 25c.; Oct., 30c.; Nov., 30c. These prices apply to all following cases where eggs were sold for eating.

The above table also shows that the average time taken to 'break up' a hen when broody was 6 days and it was 6 days more before she began laying again.

In the cost of the rations is included the feeding of the male bird from January to July. It is the same in following tables.

TABLE 2.—Individual Hen Records shown by Trap Nests, Barred Plymouth Rock hens, 3 years of age. Pen No. 2.

FROM DECEMBER 1, 1904, TO NOVEMBER 1, 1905.

Hen No.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total of Eggs laid.	Remarks.
	1905											1904		
*4	0	0	2	18	14	10	0	0	0	0	....	0	44	Showed no broodiness.
*5	0	0	0	3	1	0	0	0	0	0	....	0	4	"
*20	0	1	0	10	10	4	11	0	0	0	...	0	36	Broody once, and broken up.
25	2	14	18	18	10	8	3	0	0	0	....	3	76	" "
30	0	1	16	13	9	5	7	5	1	0	....	0	57	Broody 5 times, but broken up.
*35	0	0	5	15	13	8	1	0	0	0	....	0	42	Broody once "
37	0	0	0	19	10	9	13	6	5	0	....	0	62	" four times "
67	1	15	5	12	12	9	2	4	2	0	....	0	62	" six " "
77	9	19	8	9	11	12	12	4	5	8	....	11	108	Broody in Mch. Used as setter from Apl. 7 to May 7. Broody but broken up four times after this.
78	0	0	16	6	2	10	11	1	0	0	....	0	46	Broody but broken up 3 times.
91	17	17	20	25	24	7	19	10	3	14	....	16	172	" once but broken up.
*98	0	0	10	15	13	2	0	0	0	0	....	0	40	" " "
						1			1				2	These eggs were laid in the straw on the floor.
Totals	29	67	100	163	129	85	79	30	17	22	....	30	751	

* Hens marked with an asterisk were the poorest layers, and were neither used nor sold for breeding purposes.

RATIONS.

Rations and their composition used in feeding above pen of fowls were as follows:—

Whole grain ration, ½ wheat, ½ oats, fed in quantity of 1½ lb. per pen per day.

Mash—same as in Table I, but fed once every three days and in quantity of ¾ lb. instead of 1 lb. per pen.

Cut bone and roots three times per week.

Grit, oyster shells, drink water in regular supply.

EXPENDITURE AND RECEIPTS.

Cost of grain, 450 lb. at 1¼c. per lb.	$5 62	
" mash, 130½ lb. at 1c. per lb.	1 31	
" cut bone, 34 lb. at 2c. per lb.	0 68	
" roots (in winter), 52 lb. at ½c. per lb.	0 26	
" grit and shell, 29½ lb.	0 20	
" 18 egg boxes for shipping at 8c. each.	1 44	
		$9 51

RECEIPTS.

Value of 481 eggs sold for eating	$9 87	
" 270 eggs for breeding, 18 settings of 15 eggs each.	18 00	
		$27 87
Gain of.		$18 36

or $1.53 per hen.

TABLE No. 3.—Individual Hen Records shown by Trap Nests, White Plymouth Rocks, three years of age. Pen No. 3.

FROM DECEMBER 1, 1904, TO NOVEMBER 1, 1905.

Hen No.	January.	February.	March.	April.	May.	June.	July,	August.	September.	October.	November.	December.	Total of Eggs laid.	Remarks.
	1905											1904		
*3	0	0	0	0	0	0	0	....	....	....	....	0	00	Died August 15, 1905.
*10	0	0	0	14	18	0	0	0	0	0	....	0	32	Did not become broody.
32	21	22	13	18	24	5	10	0	0	15	....	17	145	Broody 3 times but broken-up.
68	0	7	7	14	22	13	0	4	0	0	....	0	67	Did not become broody.
76	1	0	....	....	...	....	....	....	....	....	....	0	1	Died Feb. 16.
86	0	2	....	....	...	....	....	....	....	....	..	0	2	Died March 7.
93	0	5	13	10	16	11	8	0	0	0	....	0	63	Did not become broody.
*95	0	0	4	19	9	0	1	0	0	0	....	0	33	" "
30	0	3	6	25	22	22	11	5	0	0	....	0	94	Broody once ; broken up.
46	0	....	....	...	....	....	....	....	....	....	..	0	00	Died Jan. 23.
55	0	0	10	23	23	20	11	0	9	0	..	0	96	Did not become broody.
100	2	13	7	24	24	21	10	0	10	17	....	0	128	" "
Totals..	24	52	60	147	158	92	51	9	19	32	....	17	661	

Hens marked thus * were poor layers, and were neither used nor sold as breeding stock.

RATIONS.

Rations fed to above pen of fowls were:—
Wheat 1½ lbs. per diem.
Cut bone, ¾ lb. to 1 lb. every second day.
Roots, ¾ lb. every second day.

Mash was given in summer time to replace the cut bone and in the same quantity, viz., 1 part shorts, 1 part meat meal.

EXPENDITURE AND RECEIPTS.

Value of grain, 398 lbs., at 1¼c. per lb.	$4 98	
" mash, 125 lbs. at 2c. per lb.	2 50	
" roots, 137 lbs. at ½c. per lb. (in winter)	0 68	
" grit and shell, 24 lbs.	0 20	
" 11 egg boxes for shipping at 8c. each	0 88	
		$9 24

RECEIPTS.

Value of 503 eggs sold for eating	$10 08	
" 158 eggs sold for breeding, 10½ settings of 15 eggs each	10 50	
		$20 58
Gain of		$11 34

or $1.13 per hen (10 birds in pen).

Nos. 30, 55 and 100 which were pullets were selected with other good layers for breeders. It will be noticed that several hens in this group did not become broody. Their selection for breeding stock might be the first step in building up a non-setting strain of White Plymouth Rocks.

TABLE No. 4.—Individual Hen Records by Trap Nests, Buff Orpington Hens, two years of age. Pen No. 4.

FROM DECEMBER 1, 1904, TO NOVEMBER 1, 1905.

Hen No.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total of Eggs laid.	Remarks.
	1905										1904			
*1	0	1	5	2	0	0	0	0	0	0	....	0	8	Showed no desire to sit.
7	7	20	12	12	10	6	4	6	0	0	....	0	77	Broody 3 times ; broken up.
13	18	10	11	0	0	0	12	4	3	0	....	2	60	Broody 4 times and set from June 2 to 23.
17	9	1	25	0	18	4	12	0	5	0	....	12	86	Broody 3 times ; broken up.
29	4	5	15	0	13	0	9	5	0	0	...	15	66	Broody 3 times ; set May 23 to June 17.
47	18	13	9	2	0	0	5	2	0	0	....	0	49	Broody twice ; set and raised chicks from April 17 to July 13.
53	14	15	16	5	13	6	5	6	1	8	....	13	102	Broody 6 times ; broken up.
63	0	2	21	3	0	12	6	3	7	0	....	0	54	Set from April 7 to May 3 ; Broody twice afterwards.
66	7	8	19	6	15	12	8	1	9	0	....	6	91	Broody 4 times ; broken up.
76	16	7	12	14	0	14	10	0	3	6	....	15	97	" 5 "
*86	0	1	5	5	10	9	3	5	1	0	....	0	39	" 1 "
*90	0	0	0	0	0	13	1	0	0	0	....	0	14	" 1 "
	....	....	....	....	1	1	..	....	....	....	....	....	2	These two eggs were laid in the straw on the floor.
Totals..	93	83	150	49	80	76	75	32	29	14	...	63	745	

The three hens marked * were neither used nor sold for breeding stock.

RATIONS TO ABOVE GROUP.

Whole grain ration composed of ½ wheat and ½ oats, 1½ lbs. per day.
Mash, twice per week.
Cut bone and roots, twice per week.
Grit, oyster shells and drink water in abundant supply.

EXPENDITURE AND RECEIPTS.

Cost of grain, 456 lbs. at 1¼c. per lb.	$ 5 70	
" mash, 135 lbs. at 1c. per lb.	1 35	
" cut bone, 35 lbs. at 2c. per lb. (in winter)	0 70	
" roots, 50 lbs. at ½c. per lb. (in winter)	0 25	
" grit and oyster shell, 35 lbs.	0 25	
" six egg boxes for shipping at 8c. each	0 54	
		$ 8 79

RECEIPTS.

Value of 655 eggs sold for eating	$14 63	
" 90 eggs sold for breeding, 6 settings of 15 eggs each	6 00	
		20 63
Gain of		$11 84

Or $0.99 per hen. It will be noticed from the table that hens Nos. 1, 86 and 90 laid very few eggs. They were not only non-profitable, but partly ate the profits made by others. This is a striking instance of the value of the trap nest in discovering non-layers.

TABLE No. 5.—Individual New Records by Trap Nests—White Leghorn Pullets.
Pen No. 5.

FROM DECEMBER 1, 1904, TO NOVEMBER 1, 1905.

Hen No.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total No. of Eggs laid.	Remarks.
10	17	6	9	23	19	13	8	0	0	0	....	0	95	
11	17	16	16	22	21	14	4	5	0	0	....	0	115	
34	4	6	9	10	14	9	2	0	0	0	....	0	54	
50	5	1	4	8	10	13	6	0	0	0	....	5	52	
53	16	12	13	16	12	9	3	0	0	0	...	9	90	
58	0	1	11	15	17	13	1	0	0	0	....	0	58	
63	14	15	18	18	21	17	4	0	0	0	....	0	107	
65	1	0	2	14	20	12	4	0	0	0	....	0	53	
69	0	1	6	13	16	16	9	5	3	0	....	0	69	
77	3	6	6	17	19	20	2	0	0	0	....	3	76	
84	7	12	9	20	16	9	0	....	....	....	....	0	73	Dead, August 26.
90	16	19	16	16	21	14	0	4	1	0	....	4	111	
97	11	6	8	19	1	10	1	0	1	0	....	0	57	
99	18	8	15	19	23	15	0	4	7	2	....	8	119	
Totals..	129	109	142	230	230	184	44	18	12	2	....	29	1,129	

Two pens were selected from the above group of fowls, one composed of good and the other of bad layers. The good layers were selected from hens Nos. 11, 53, 63 and 90, which represented an average of 105 eggs per hen per year. The poor egg layers chosen were 34, 50 and 65, representing the small average of 53 eggs each per year. Results from these two widely differing pens will be noted with interest after another season.

RATIONS FED TO ABOVE PULLETS.

Whole grain ration, one-half oats one-half wheat, twice per day.

Mash composed of two parts shorts, one part ground oats and one part ground barley, three times per week.

Cut bone three times per week.

Roots three times per week.

Grit and oyster shells in abundance.

EXPENDITURE AND RECEIPTS.

Cost of grain, 440 lbs. at 1¼c. per lb..	$ 5 50	
" mash, 143 lbs. at 1c. per lb..	1 43	
" cut bone, 38 lbs. at 2c. per lb..	0 76	
" roots, 50 lbs. at ½c. per lb..	0 25	
" grit and shell..	0 25	
" 30 egg boxes for shipping at 8c. each	2 40	
		$10 59

Receipts.

Value of 679 eggs sold for eating..	$15 21	
" 450 eggs sold for breeding, 30 settings of 15 eggs each	30 00	
		$45 21
Gain of..		$34 62

or $2.88 per hen. For price of eggs sold at different periods see Table I.

TABLE No. 6.—Individual Hen Records by Trap Nests.—Cross-bred Pullets. Pen 26.

FROM DECEMBER 1, 1904 TO NOVEMBER 1, 1905.

Hen No.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total No. of Eggs laid.	Remarks.
8	11	9	0	0	0	3	....	....	....	....	....	0	23	Dead June 16.
30	21	20	8	22	18	6	3	0	0	0	....	8	106	Showed no inclination to sit.
38	7	6	1	17	21	1	0	4	1	0	....	0	58	" "
39	7	9	21	14	14	7	0	0	0	0	....	0	72	" "
48	13	8	5	14	18	3	0	0	0	0	....	0	61	" "
74	14	20	23	13	0	....	....	....	....	....	....	0	70	Dead May 3.
75	10	5	5	13	10	6	1	0	0	0	....	0	50	Dead October 3.
76	7	18	10	15	23	7	0	0	0	6	....	0	86	No inclination to sit.
87	11	9	8	15	16	2	0	0	0	0	....	1	62	Broody once; broken up.
94	0	1	6	6	9	13	0	9	0	0	....	0	44	" "
Totals..	101	105	87	129	129	48	4	13	1	6	....	9	632	

RATIONS FED TO ABOVE PEN 26.

Whole grain ration ½ wheat ½ buckwheat ...	20 ozs. per day.
Mash—2 parts shorts, 1 part oats ground, 1 part ground barley..	10 " every 3 days.
Cut green bone..	10 " "
Roots..	10 " "

Grit and oyster shells in sufficient quantity.

COST OF RATIONS.

Grain, 370 lbs. at 1¼ cents per lb..	$4 63	
Mash, 122 lbs. at 1 cent per lb.	1 22	
Cut bone, 24 lbs. at 2 cents per lb..	0 48	
Roots, 35 lbs. at ½ cent per lb..	0 18	
Grit and shell, 30 lbs...	0 25	
		$ 6 76

RECEIPTS FROM SALE OF EGGS.

Value of eggs sold during the year..	13 37
Gain made..	$ 6 61

or 66 cents per hen.

TABLE No. 7.—Individual hen records by trap nests. Cross bred pullets. Pen No. 27.

FROM DECEMBER 1, 1904 TO NOVEMBER 1, 1905.

Hen No.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total of Eggs laid.	Remarks.
	1905											1904		
2	6	18	21	26	22	12	2	4	0	0	....	0	111	Showed no desire to sit.
35	3	10	3	10	2	14	4	5	0	11	....	0	62	Broody once; but broken up Sat from April 19 to May 27.
36	0	1	1	1	17	11	3	0	0	0	....	0	34	Broody 3 times after this.
40	4	13	5	21	5	16	10	6	0	0	....	0	80	Broody 4 times: broken up.
46	0	7	12	15	16	14	7	6	4	0	...	0	81	Showed no broodiness.
51	3	5	8	15	19	10	7	3	6	0	....	0	76	Broody once; broken up.
69	2	10	13	19	21	11	11	1	0	0	....	0	88	" "
62	8	6	8	9	12	3	0	0	0	0	....	0	46	Did not sit.
69	0	0	1	13	21	19	8	4	0	13	....	0	79	"
70	2	6	2	17	10	17	5	0	4	0	....	0	63	Broody once; broken up.
Totals..	28	76	74	146	145	127	57	29	14	24	....	0	720	

RATIONS FED TO ABOVE PEN 27.

Whole grain—Oats only..	20 ozs. per day.
Mash..	8 " "
Roots..	1 lb. "

Grit and oyster shells in regular supply.

COST OF RATIONS.

Oats, 408 lbs. at 1 cent per lb..	$ 4 08	
Mash, 178 lbs. at 1 cent per lb..	1 78	
Roots, 154 lbs. at ½ cent per lb..	0 77	
Grit and oyster shells, 30 lbs..	0 25	
		$ 6 88

RECEIPTS FROM SALE OF EGGS

Value of eggs sold during the year..	$11 59
Gain made by this pen..	$5 71

or 57 cents per hen. Average number of eggs laid per hen, 72.

ESTABLISHING STRAINS OF PROLIFIC WINTER LAYERS COMBINED WITH CORRECT MARKET TYPE.

SELECTION BY MEANS OF TRAP NESTS.

With the object of establishing strains of fowls which would make good winter layers in unheated quarters, combined with correct market types, 23 Barred Plymouth Rock and a similar number of White Wyandotte pullets were placed, during the fall of last year, in a new poultry house of most approved pattern, a full description and illustration of which appeared in report of 1904. Both varieties of the fowls named are well known as most acceptable market types and particularly suited to make excellent layers in cold quarters. Trap nests were used to distinguish between the good and the bad layers. The results of the first year's experience in the prosecution of this work is given in the following tables, which with calculations based thereon convey useful and instructive information.

TABLE 1.—Barred Plymouth Rock pullets. Individual records shown by trap nests. Pen 34.

FROM DECEMBER 1, 1904 TO NOVEMBER 1, 1905.

Hen No.	January.	Februasy.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total of Eggs laid.	Remarks.
	1905											1904		
2	0	2	0	11	12	15	5	0	0	0	....	0	45	Showed no inclination to set.
3	0	0	18	25	17	15	8	0	0	0	....	0	83	Broody twice; broken up.
4	0	0	3	12	21	16	12	2	7	0	....	0	73	" once "
*9	0	0	2	0	0	0	0	1	0	0	....	0	3	" 3 times "
15	0	2	24	17	18	6	1	0	0	0	....	0	68	Dead, Aug. 17.
21	0	0	3	18	12	9	8	3	0	0	...	0	53	Broody twice; broken up.
*26	0	0	0	8	8	7	7	0	0	0	....	0	30	" 4 times "
33	0	12	19	15	0	7	4	0	0	0	....	0	57	" twice "
34	0	0	9	14	15	12	10	1	0	0	....	0	61	Showed no broodiness.
39	0	2	13	18	22	5	14	0	0	0	....	0	74	Broody twice; broken up.
46	0	0	9	16	20	6	6	0	0	0	...	0	57	" once "
53	0	3	18	18	16	8	7	5	0	0	....	0	75	" " "
56	0	0	9	14	17	9	6	6	2	0	....	0	63	" 4 times "
61	0	0	19	17	16	12	11	0	0	0	....	0	75	" 3 "
66	0	1	0	1	0	0	0	0	0	0	....	0	2	Dead, Map 24.
72	0	0	14	18	19	12	8	0	0	0	....	0	71	Broody 3 times; broken up.
74	0	1	16	11	15	10	7	....	4	14	....	0	78	" 4 "
75	0	10	11	6	0	0	10	0	0	0	....	0	37	" 3 "
85	0	5	13	21	10	22	13	5	0	8	....	0	97	" 3 "
94	0	6	14	19	18	15	8	2	0	0	....	0	82	" 3 "
95	0	6	23	23	17	12	18	1	0	0	....	0	100	" once "
96	0	0	17	26	11	11	13	9	0	0	....	0	87	" " "
98	0	0	13	21	16	18	12	0	0	0	....	0	80	" 3 times "
	....	....	...	....	....	1	....	1	....	....	....	....	2	These eggs were found on floor in straw.
Totals..	0	50	267	349	300	228	188	36	13	22	....	0	1,455	

None of the pullets in this or the following pen were used for sitters.

The cock bird died during first week in May, but was replaced.

The average egg production of the birds in this pen was 63¼ eggs per hen per year.

TABLE 2.—White Wyandotte Pullets. Pen 35.

FROM DECEMBER 1, 1904, TO NOVEMBER 1, 1905.

Hen No.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total of Eggs laid.	Remarks.
	1905											1904		
1	0	6	22	20	18	15	13	0	0	0	....	0	94	No inclination to set.
3	1	18	20	20	19	19	13	4	0	0	....	0	114	"
5	0	0	12	10	12	15	9	0	0	0	....	0	58	"
15	0	0	18	23	12	20	12	0	0	0	....	0	85	Broody once. Broken up.
* 16	0	0	0	0	2	22	14	0	0	0	....	0	38	No inclination to set.
19	0	7	11	9	14	12	12	2	0	0	....	0	67	Broody 4 times. Broken up.
24	6	18	16	18	13	16	10	1	0	0	....	0	98	" 3 " "
* 32	0	0	0	8	15	14	12	1	0	0	...	0	50	No inclination to set.
41	0	7	14	18	13	10	14	0	0	0	..	0	76	"
* 43	0	0	2	6	5	17	7	0	0	0	....	0	37	Broody once. Broken up.
* 48	0	0	1	4	13	8	7	0	0	0	....	0	33	" "
* 49	0	0	1	17	18	16	3	0	0	0	...	0	55	" "
67	0	2	14	13	9	7	8	4	0	0	....	0	57	Broody 4 times. "
68	0	0	13	15	9	8	4	1	0	0	...	0	60	" 3 " "
* 69	0	3	0	13	14	7	8	0	0	0	....	0	45	No inclination to set.
73	0	0	13	20	12	7	11	0	0	0	....	0	63	"
* 77	0	0	7	9	13	12	7	1	0	0	....	0	49	Broody twice. Broken up.
* 79	0	0	9	6	11	13	5	0	0	0	....	0	44	" 3 times. "
83	4	4	21	19	16	11	11	0	0	0	....	0	86	No inclination to set.
* 84	0	0	0	15	18	10	4	0	0	0	....	0	47	"
85	0	4	10	6	12	10	8	0	0	0	....	0	50	Broody 3 times. Broken up.
88	3	4	11	18	13	7	4	0	0	0	....	0	60	" once. "
92	0	0	9	14	10	13	5	0	0	0	....	0	51	" " "
	0	0	10	5	3	3	1	3	0	0	....	0	25	These eggs were laid in the straw on the floor.
Totals..	14	73	234	306	304	292	202	17	0	0	....	0	1,442	

The egg production per hen per year of the above pen was $62\frac{3}{4}$.

The fowls of both pens had opportunity to run outside on a manure heap on and after February 26. The pullets in neither pen laid early for the reason that they were hatched late.

RATIONS AND HOW FED TO ABOVE PULLETS.

The rations fed to the fowls in the foregoing pens 34 and 35, and manner of feeding them was as follows:—

Whole grain—$\frac{1}{3}$ wheat, $\frac{1}{3}$ buckwheat, and $\frac{1}{3}$ oats. This was thrown in the straw on the floor of the scratching sheds, morning and evening, in quantities of 6 to 10 lbs., according to the weather. It was found that the most grain was consumed during the colder weather.

Mash.—Was composed of two parts shorts, one part ground oats, one part ground barley. This was fed at noon in quantity of 3 lbs. per day in a trough in the roosting room.

Cut bone.—Fed in quantity of $2\frac{1}{2}$ lbs. every 3 days.

Roots.—About 3 lbs. every 3 days.

Grit, ground oyster shells and drink water were in regular supply.

REVENUE AND EXPENDITURE IN CONNECTION WITH FOREGOING PENS 34 AND 35.

It will be noticed that the receipts in the following calculations are arranged to show in:—

No. 1 Table.—Revenue from sale of eggs only.

No. 2 Table.—Cost of rearing 100 chickens from May 1 to July 21, 1905, and then the cost of feeding the same chickens from July 21 to September 1 (4 months in all). These details show that if sold at end of July the chickens would have been worth more than at the later period.

No. 3 Table.—Value of the combination of egg layers and market types.

No. 4 Table.—Revenue made by C. E. F. Poultry Department by sale of eggs and stock for breeding pruposes.

TABLE 1.

Revenue from sale of Eggs for eating and hatching purposes with value of Birds and cost of feeding.

Value of 46 pullets at $1 each	$46 00
“ 2 cockerels at $1 each	2 00
“ grain, 272 lbs. at 1¼ cents per lb.	34 05
“ mash, 680 lbs. at 1 cent per lb.	6 80
“ cut bone, 178 lbs. at 2 cents per lb.	3 56
“ beets, 174 lbs. at ½ cent per lb.	0 87
“ grit and oyster shell	1 00
“ 66 egg boxes for shipping at 8 cents each	5 28
	$99 56

Receipts from sale of Eggs.

Value of eggs sold during the year	$33 00
“ “ for breeding purposes, 66 settings, 15 eggs each	66 00
“ 44 hens on hand, at $1	44 00
“ 1 cock on hand, at $1	1 00
	$144 00

Lost during the year, 3 birds; gain, $44.44, or 96 cents per hen.

TABLE 2.

Showing cost of rearing 100 chickens from birth to the age of 2 months and 21 days (May 1 to July 21).

Chickens in lot: Barred Plymouth Rocks and White Wyandottes (45 cockerels and 55 pullets).

Cost of production—	
250 eggs for incubation, at 2 cents each	$5 00
Coal oil, 4 galls., at 25 cents, $1; interest on machine, $1.25	2 25
Food consumed—	
38 eggs, at 2 cents, cut up for mash	0 76
13 lbs. bread, at 3 cents	0 36
5½ lbs. rice, at 5 cents	0 27
5 lbs. oatmeal, 2½ cents	0 13
118 lbs. wheat, at 1¼ cents	1 48
17 lbs. ground barley, at 1 cent	0 17
10½ lbs. meat meal, at 2½ cents	0 26
12 lbs. ground oats, at 1 cent	0 12
Total cost of production	$11 80

Total weight of lot at age of 2 months and 21 days, 148½ lbs.
Value of lot, 148½ lbs., at 25 cents per lb. $37 12

Net profit $25 32

Cost of feeding 100 chickens during 1 month and 10 days (July 21 to September 1).

Food consumed—

12 lbs. meat meal at 2½ cents	0 30
5 lbs. barley, at 1 cent	0 05
30 lbs. shorts, at 1 cent	0 30
34 lbs. ground oats, at 1 cent	0 34
128 lbs. wheat, at 1¼ cents	1 60
25 lbs. oats, at 1 cent	0 25
Total cost of feeding	$2 84

Total weight of lot at age of 4 months, 272 lbs.
Total gain in live weight during feeding period, 123½ lbs.

Value of increased weight, 123½ lbs., at 13 cents	$16 06
Net profit	$13 22

Total weight of chickens at age of 4 months, 272 lbs. at 13 cents	$34 66
Total cost of production, $11.80 and $2.84	14 64
Total net profit	20 02

TABLE 3.—Showing value of eggs sold from pens 34 and 35 for hatching, and value of chickens at 4 months from eggs from these pens.

COST OF PRODUCTION.

Value of breeding stock, 46 pullets at $1	$46 00	
Value of breeding stock, 2 cockerels at $1	2 00	
Value of food consumed by old birds	46 28	
Cost of rearing 100 chickens, at 4 months of age (Sept. 1)	14 64	
		$108 92

RECEIPTS FROM EGGS AND FLESH.

Value of eggs sold during the year	$33 00	
Value of eggs sold for breeding, 49 settings at $1.	49 00	
Value of 100 chickens at age of 4 months (Sept. 1), weight 272 lbs., at 13 cents	34 66	
Value of 44 yearling hens, at $1	44 00	
Value of 1 yearling cock, at $1	1 00	
Lost during the year, 3 birds.		
		161 66
Net profit		$52 74

or $1.15 by each hen.

TABLE 4.—Revenue made from sale of eggs for hatching and stock for breeding purposes. Pens 34 and 35.

Value of breeding stock, 2 cockerels, 46 pullets..	$48 00	
Value of food consumed..	46 28	
Cost of rearing 100 chickens at age of 4 months (Sept. 1)..	14 64	
Cost of 50 shipping egg boxes, at 8 cents each..	4 00	
Cost of 35 coops (shipping birds), at 25 cents each	8 75	
		$121 67
Value of eggs sold during the year..	$33 00	
Value of eggs sold for breeding..	49 00	
Value of 35 cockerels sold for breeding, at $1..	35 00	
Value of 10 pullets sold for breeding, at $1.. ..	10 00	
Value of 18 chickens sold for eating, 45 lbs., at 13 cents..	5 85	
Value of cockerel on hand, at $1..	1 00	
Value of 30 pullets on hand, at $1..	30 00	
Value of breeding stock..	48 00	
		211 85
Lost during the year, 3 birds..	$3 00	
Net profit..		$87 18

or $1.89½ by each hen.

INCUBATION.

HATCHING RESULTS FROM INCUBATORS AND HENS. CHICKENS HATCHED FROM HENS KEPT IN WARMED AND COLD HOUSES.

On the dates named in the following tables, two incubators—as described—were set in operation in the same building. Some interesting results are shown, among which will be noted the difference in the germ strength of eggs laid by fowls which were kept in houses without any artificial heat, but with scratching shed attachment, and those from hens in partially warmed compartments, but with no such opportunity for exercise or such abundance of fresh air.

Description of Eggs.	Pen No.	No. of Eggs.	Clear.	Dead Germs.	Dead in Shell.	Chickens hatched.	Percentage.	No. of Days.	Time of Cooling.	TEMP. OF INCUBATORS.				Temp. of Room. F.		Remarks.
										Hot Water.		Hot Air.				
Test No 1.—Hot Water Incubator.									Minutes	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	
Barred Plymouth Rock..........	2	81	17	29	1	34	42	1	0	100	100	100	101	68	76	
White Plymouth Rock..........	3	28	11	6	0	11	39¼	2	0	103	103½	102	103	54	78	
White Leghorn	5	62	14	11	2	35	56½	3	10	103	103	103	102½	62	86	3rd day, 1st cooling and turning, a.m.
Barred Plymouth Rock..........	34	38	8	4	3	23	60	4	12	103	103	103	103	70	90	
White Wyandotte..............	35	61	15	6	2	38	62	5	15	103	103	103	102½	62	84	
								6	15	102	103½	103	103	72	90	First test.
Totals	....	270	65	56	8	141	52¼	7	20	103	103	103	102½	72	88	
								8	20	103	104	103	103	70	80	
								9	25	103	102	103	103	74	90	
Test No. 2.—Hot Air Incubator.								10	30	103	103	103	103	64	86	
								11	30	102	103	103	103	68	82	
White Plymouth Rock..........	3	35	6	6	8	15	43	12	35	103	103	103	103	64	72	
White Leghorn.	5	57	9	15	12	21	37	13	35	104	103	103	103	60	74	
Silver Laced Wyandotte.........	20	14	3	3	0	8	57	14	35	103	103	103	103	58	80	
Barred Plymouth Rock..........	34	51	16	6	4	25	49	15	35	102	103½	104	104	54	78	
White Wyandotte.	35	65	19	10	8	28	43	16	40	104	102	102½	103	52	80	
								17	40	103	103	103	103	68	86	Last test.
Totals..................	......	222	53	40	32	97	43½	18	45	103	104	103	103½	60	86	
								19	45	104	103	103	102½	62	82	Last cooling, p.m.
								20	0	104	103	104	104	64	87	
								21	0	103	103	102½	102	61	88	

Some results made evident from the above figures are:—

Eggs from hens in Nos. 34 and 35 pens (cold houses) showed greatest percentage of fertility and hatched the most chickens. This corroborates the experiences of previous years, as shown in reports of 1903 and 1904.

The eggs with the weaker germs were laid by hens in pens Nos. 2, 35 and 20, which were in partially warmed houses.

The birds which laid the eggs were given the same rations in both cases.

Eggs were turned once per day after cooling. During the cooling of the eggs the doors of the incubators were left open.

Neither incubator required any moisture.

TEST NO. 3.—RESULTS FROM EGGS OBTAINED FROM FARMERS AT END OF AUGUST.

For the purpose of showing the hatching of chickens by incubator during the fair of the Canada Central Exhibition held in this city from September 8 to 16 last, the following number of eggs were purchased from neighbouring farmers and placed in two incubators. The eggs which were from hens that had laid well during the season, but had free run, showed remarkable fertility and strength of germ. The incubators were placed on an inclosed platform around which a constant stream of people passed. There was much vibration, but this did not seriously interfere with results.

EGGS FROM FARMERS' FOWLS. HATCHED IN INCUBATORS.

Description of Eggs.	Kind of Incubator.	No. of Eggs.	Clear.	Dead Germs.	Dead in Shell.	Chickens Hatched.	Percentage.	Remarks.
Barred P. Rock, farmers stock...	Hot water..	220	25	25	10	160	72½	
" "	Hot air.....	229	20	42	15	152	66¼	

After the usual stay of 24 hours in the nurseries of the incubators, the chickens were removed to brooders close at hand where they made good growth.

TEST NO. 4.—HATCHING EGGS BY HENS.

The following eggs, which were imported from England, were given to four hens on April 28 last. Results obtained were:—

Description of Eggs.	No. of Eggs.	Broken by Hens.	Clear.	Dead Germs.	Dead in Shell.	Chickens Hatched.	Percentage.	Remarks.
Faverolle	14	2	3	2	1	6	43	Strong chickens.
Buff Orpington	24	6	5	1	3	9	37½	"
White "	24	8	4	3	3	6	29	"
S. G. Dorkings	24	......	18	2	2	2	8⅓	Weak chickens.
Total...........	86	16	30	8	9	23	26½	

TEST No. 5.—The eggs as described in following table were from Experimental Farm stock. They were set under hens on April 28 last. Particulars are:—

Description of Eggs.	Pen No.	No. of Eggs.	Clear.	Dead Germs.	Dead in Shell.	Chickens Hatched.	Percentage.	Remarks.
Barred P. Rock	2	12	1	3	2	6	50	
White "	3	12	1	1	2	8	66½	
" Leghorn	5	13	2	1	2	8	61½	} 53¾ per cent.
" "	5	13	3	2	2	6	46	
S. L. Wyandotte	20	12	0	1	1	10	83⅓	
Barred P. Rock	34	13	4	2	0	7	54	
Total	......	75	11	10	9	45	60	

FLESHING CHICKENS IN PENS AND CRATES.

The following tables show details in connection with the fattening of chickens conducted during the months of August and September last.

TABLE No. 1.—DETAILS OF EXPERIMENT IN FLESHING CHICKENS IN PENS, AUGUST 3, 1905.

Pen or Crate.	No. of leg band on Chicken.	Breed.	Cockerel or Pullet.	Age.		Weight.																				Remarks.
				Months.	Days.	Beginning of Experiment.		1st Week.		2nd Week.		3rd Week.		4th Week.		5th Week.		Average at beginning of experiment.		Average at close of experiment.		Average total gain by chickens in 5 weeks.		Average gain by chickens in 1 week.		
						Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	
Group No. 1—																										
Pen	11	B. Ply. R.	C	2	20	2	10	3	2	3	10	4	2	4	10	5	4	2	3	4	5	2	2	0	6⅘	Capons.
"	15	S. L. Wy.	C	2	12	1	9	1	10	2	0	2	6	2	13	3	4									
"	23	"	C	2	12	2	1	2	0	2	5	2	12	3	5	3	12									
"	25	B. Ply. R.	C	2	20	2	5	2	11	3	0	3	8	4	0	4	9									
"	29	S. L. Wy.	C	2	12	1	7	1	10	2	2	2	10	3	1	3	8									
"	41	B. Ply. R.	C	2	20	2	5	2	10	3	0	3	6	3	14	4	6									
"	44	"	C	2	20	2	10	2	12	3	4	3	12	4	6	5	0									
"	55	Crosses.	C	2	8	1	14	2	0	2	6	2	9	3	0	3	6									
"	71	B. Ply. R.	C	2	20	2	6	2	9	2	14	3	13	4	8	5	4									
"	88	Crosses.	C	2	8	2	2	2	5	2	14	3	3	3	10	4	1									
"	99	B. Ply. R.	C	2	20	2	13	3	2	3	8	4	0	4	8	4	14									
Group No. 2—																										
Pen	21	B. Ply. R.	C	2	20	2	7	2	12	3	1	3	7	3	14	4	2	2	6	4	4	1	14	0	6	
"	35	"	C	2	20	2	8	2	13	3	1	3	8	3	14	4	7									
"	50	"	C	2	20	2	10	3	1	3	4	3	10	4	2	4	8									
"	58	Crosses.	C	2	8	1	8	1	5	1	10	2	0	2	4	2	8									
"	59	S. L. Wy.	C	2	12	2	0	2	7	2	11	3	1	3	8	3	12									
"	70	B. Ply. R.	C	2	20	2	7	2	14	3	2	3	8	3	12	4	6									
"	72	"	C	2	20	2	8	2	11	3	1	3	7	3	15	4	5									
"	75	"	C	2	20	2	8	2	13	3	1	3	8	3	14	4	7									
"	83	S. L. Wy.	C	2	12	1	13	2	13	2	9	2	14	3	6	3	14									
"	88	B. Ply. R.	C	2	20	2	8	2	8	2	15	3	6	3	10	4	2									
"	90	"	C	3	2	3	2	4	1	4	8	5	7	5	15	6	8									

TABLE NO. 2.—DETAILS OF EXPERIMENT FLESHING CHICKENS IN PENS AND CRATES, AUGUST 3, 1905.

Pen or Crate.	No. of leg band on Chicken.	Breed.	Cockerel or Pullet.	Age.		Weight.																				Remarks.
				Months.	Days.	Beginning of Experiment.		1st Week.		2nd Week.		3rd Week.		4th Week.		5th Week.		Average at beginning of experiment.		Average at close of experiment.		Average total gain by chickens in 5 weeks.		Average gain by chickens in 1 week.		
						Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	
Group No. 3— Crate	8	B. Ply. R.	C	2	20	2	7	2	13	3	2	3	14	4	6	4	12	2	12	4	15	2	3	0	7	
"	18	"	C	2	28	2	14	3	4	3	12	4	7	5	0	5	7									
"	33	"	C	3	4	3	1	3	6	3	7	4	0	4	5	4	12									
"	83	"	C	3	4	3	2	3	10	3	12	4	5	5	0	5	8									
"	84	"	C	2	20	2	6	2	10	3	0	3	8	4	0	4	4									
"	92	"	C	2	20	2	7	2	5	2	12	3	5	3	12	4	2									
"	96	"	C	2	20	2	8	3	0	3	6	3	14	4	4	4	10									
"	99	"	C	3	10	3	7	3	11	4	2	4	14	5	7	5	14									
Group No. 4— Pen	26	B. Ply. R.	C	2	20	2	14	3	4	3	11	4	4	4	12	5	0	2	14	5	2	2	4	0	7⅕	
"	27	"	C	3	4	3	0	3	2	3	9	4	2	4	10	5	2									
"	36	"	C	2	20	2	15	3	10	4	1	4	8	5	2	5	2									
"	49	"	C	3	4	3	6	3	14	4	4	4	11	5	1	5	8									
"	68	"	C	2	20	2	9	3	1	3	8	4	1	4	10	5	0									
"	80	"	C	2	20	2	11	2	14	3	5	3	12	4	6	4	12									
"	81	"	C	3	4	3	4	3	11	3	14	4	8	5	3	5	11									
"	96	"	C	2	20	2	8	2	14	3	6	3	14	4	10	5	0									

SUMMARY OF RESULTS.

TABLE No. 3—WEIGHT, Development, Cost of Production, Profit from sale of Fowls.

Group No.	Pen or Crate.	Number of Chickens.	WEIGHT.				Total increase in 5 weeks.		COST OF PRODUCTION.							Return from sale at 14c. per lb.	Profit. Labour not counted.	Remarks.
			At beginning of experiment.		At close of experiment.				Chickens.			Food.		Cost of production, one pound of increase.	Total cost of production.			
									Initial weight.		Value at 13c. per lb.	Amount consumed in 5 weeks.	Value at 1c. per lb.					
			Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	$ cts.	Lbs.	Cts.	Cts.	$ cts.	$ cts.	$ cts.	*Rations for each Group.*
1	Pen....	11	24	2	47	4	23	2	24	2	3 13	56½	57	2 9/10	3 80	6 61	2 81	Ground oats, 3 parts ; ground barley, 2 parts ; mixed with skimmed milk.
2	Pen....	11	25	15	46	15	21	0	25	15	3 37	57½	58	3¼	4 05	6 57	2 51	
3	Crate...	8	22	4	39	5	17	1	22	4	2 89	51½	52	3 6/10	3 51	5 50	1 99	10c. allowed for skimmed milk, in cost of production, for each group.
4	Pen....	8	23	3	41	3	18	0	23	3	3 01	51½	52	3 4/10	3 63	5 76	2 13	

FERTILIZATION AFTER MATING.

In report of last year several instances are given with the object of showing how long after the removal of the male bird from the breeding pen, the effect of fertilization was strong enough to hatch strong chickens. The limit was found to be the eighth day. In the following table results are given to show how soon after mating the cock bird with the hens fertilization was sufficiently strong to hatch out vigorous chickens.

Hen No.	Date and Hour of First Mating.		Number of Hours between First Mating and laying of First Egg.	Number of Hours between First Mating and laying of First Fertile Egg.	Remarks.
	Date.	Hour.			
8	May 29..	3.16 p.m..	....	54.10 M.	A strong, healthy chicken hatched.
30	" 29..	0.00 " ..	....	....	The first fertile egg was laid on fifth day after mating.
38	" 29..	3.00 " ..	18.15 M.	65.40 M.	This egg was broken in turning.
39	" 29..	3.45 " ..	....	....	Egg fertile ninth day after mating.
48	" 29..	4.05 " ..	20.35 M.	....	" fourth "
75	" 29..	3.18 " ..	....	42.18 M.	Strong chickens hatched.
76	" 29..	3.53 " ..	17.05 M.	41.08 M.	" "
87	" 29..	4.45 " ..	....	39.15 M.	" "
94	" 29..	3.02 " ..	17.20 M.	41.50 M.	" "

In the above experiment pullets only were put into the breeding pen.

NUMBER OF EGGS LAID DURING THE YEAR.

The following number of eggs were laid during the different months of the past year:—

December, 1904	391
January, 1905	986
February	1,386
March	2,162
April	3,001
May	2,912
June	2,204
July	1,116
August	310
September	218
October	182
November	355
	15,223

EGGS LAID IN SIX MONTHS. OLD HENS VS. PULLETS.

The following table shows the number of eggs laid by old hens and pullets of different breeds during the first six months of the year. Results convey some useful and interesting lessons which are noted in a later page. The rations used and method of feeding them will be found effective in the winter production of eggs.

Results of Six Months Egg-laying by Pullets and Old Hens.

No.	Variety.	Age.	January.	February.	March.	April.	May.	June.	Totals for 6 months.
12	Buff Orpington	3 years old	90	80	150	49	70	71	511
11	White Leghorn	Pullets	142	116	122	185	178	135	878
12	S. G. Dorkings	2 and 3 years old	69	91	94	95	73	52	474
11	Black Minorcas	Pullets	54	53	76	136	180	119	618
11	White Leghorns	2 and 3 years old	25	16	75	129	143	111	499
11	Buff Leghorns	Pullets	62	52	58	112	112	85	481
11	Black Hamburgs	1, 3 and 4 years old	25	63	84	122	173	120	587
6	S. S. Hamburgs	1 and 2 years old	39	43	49	95	108	87	421
6	S. L. Wyandottes	2 years old	28	54	54	72	60	28	296
10	Buff Orpingtons	Pullets	86	103	85	103	38	67	482
10	White Wyandottes	3 years old	58	51	101	102	117	84	513
*23	B. P. Rocks	Pullets, late	6	50	268	349	300	228	1,201
*23	White Wyandottes	"	8	75	237	304	304	292	1,220
		Totals	692	848	1,453	1,853	1,856	1,479	8,181

* These pullets were in a poultry house with scratching shed attachment. No artificial heat. The windows of the scratching shed were open on fine days during winter.

Some deductions from the above record are noted as follows:—

Ten White Wyandotte hens, 3 years of age, laid more eggs than the same number of Buff Orpington pullets.

Eleven White Leghorn hens, two and three years of age, laid more eggs than the same number of Buff Leghorn pullets.

In both the foregoing cases it is likely that the older hens were of a better egg laying strain than the pullets. But experience has shown that it is advisable not to arrive at a hasty decision in this respect for in several instances it has been noticed that poor egg laying pullets made admirable layers the year after, when hens. In connection with this feature it is remarked on page 239 of 1904 report, under the caption, 'Are fowls as good layers one season as another?' as follows: 'Records of egg laying by pullets and hens in our department, extending over eight years, go to show that pullets which laid well during their first winter did not make as good layers the next, when hens.' It was also shown that poor egg laying pullets made admirable layers when hens the next year. It will be interesting to note if the selection by trap nests of the best layers from year to year will overcome this feature. As a further means of obtaining data on the subject two breeding pens each of 6 White Leghorn pullets and cock bird, have been placed side by side. The pullets and cock bird in one pen are from parent stock which the trap nests have shown to be poor layers, and the pullets and cock bird in the other by the same agency have been noted as excellent layers. Useful results are anticipated.

Another lesson pointed out is that the majority of 23 Barred Plymouth Rock, and same number of White Wyandotte pullets did not begin to lay until March. They were actually unproductive during the winter months of highest prices. The coldness of the house may be advanced as a reason for their non-laying, and to a certain extent it doubtless retarded their growth and rapid maturity. But these pullets should have been well developed and laying before going into winter quarters, and these results can only be attained by early hatching. Again, the pullets came from parent stock which had not been accustomed to cold quarters. This, in combination with late hatching, would certainly be deterrent to early winter laying.

Remedies for the latter and other undesirable features shown by the record are suggested as follows:—

To secure early winter layers in either cold or partly warmed houses the pullets should be hatched early and come from strong and vigorous parent stock.

To have prolific layers of large eggs in either unheated or partly warmed houses, the pullets should come from hens which have proved to be good layers of large eggs.

As a means to this end trap nests—the operations of which are described in preceding pages—are coming into more general use.

A WINTER EGG-PRODUCING RATION AND METHOD OF FEEDING IT.

The rations which were fed to the fowls enumerated in foregoing record, and manner of using them were as follows. Both will be found effective in the winter production of eggs, about which there are numerous and frequent inquiries:

A. M. Ration.—Wheat or buckwheat alone or mixed with oats. This should be scattered in the litter on the floor in order to incite the fowls to exercise in searching for it.

11 A.M.—Steamed lawn clippings, 3 times per week. Other days roots or vegetables.

Noon.—A few hands full of oats thrown into each pen, if necessary to keep the fowls in exercise. Three times per week cut green bones in the proportion of one pound to 15 hens, took the place of the oats.

P. M. Ration.—Mash three times per week in such quantity as would be eaten up clean. Observation has shown that when mash was fed at the morning ration there was a tendency on the part of the fowls to eat so much of it as to make them disinclined for exercise. On the other hand, where fowls are kept in unheated houses in parts of the country where the winters are cold a small quantity of mash in the morning would probably be warming, and an incentive to egg production. In our department it has been the practice to vary the composition of the rations occasionally as well as times of feeding them. As a result, it has been shown that where there is such variety there is little likelihood of egg eating or feather picking.

Fresh water, grit and broken oyster shells were before the fowls at all times, as they should always be. The mash was composed as follows:—

Shorts, two parts.
Ground oats, one part.
Gluten meal, one part.

Occasionally small potatoes were boiled and used as a part, with evident benefit.

STOCK ON HAND DECEMBER 1, 1905.

Pen No.	Breed.	Cocks.	Hens.	Cockerels.	Pullets.	Remarks.
1	Barred Plymouth Rocks	......	......	1	......	
2	White Plymouth Rocks	......	3	1	11	
3	Buff Orpingtons	1	12	......	......	
4	"	......	......	1	11	
5	White Leghorns	1	13	......	......	
6	"	......	......	1	13	
7	Black Minorcas	1	......	......	12	
8	Silver Laced Wyandottes	1	4	......	9	
9	Buff Leghorns	1	7	......	2	
10	Mixed	......	......	4	......	2 Wh. Leghorns, 1 Bl. Minorca and 1 Bl. Hamburg.
11	Buff Orpingtons	......	......	4	......	
12	White Leghorns	......	......	5	......	
13	Black Minorcas	......	......	4	......	
14	Mixed	......	......	4	......	2 Wh. Leghorns, 2 Wh. Ply. Rocks.
15	"	......	......	5	......	1 S. L. Wy., 1 Wh. Ply. R., 1 Wy. 1 Bl. Min., 1 Buff Orp.
16 17	Black Hamburgs	1	6	......	4	
18	White Leghorns	......	......	1	6	
19	"	......	......	1	6	
20	Barred Plymouth Rocks	......	......	1	4	
21	Light Brahmas	......	3	1	2	
22	Mixed	......	......	3	......	1 Bl. Minorcas, 2 Wh. Wyandottes.
23	Buff Orpingtons	......	......	1	5	
24	White Orpingtons	......	......	1	6	
25	Barred Plymouth Rocks	1	5	......	......	
26	Faverolles	......	2	1	4	
27	Silver Grey Dorkings	1	6	......	......	
28	Black Minorcas	1	5	......	3	
29	Crosses	1	7	......	2	
30	"	......	9	......	1	
31	Mixed	......	......	8	......	5 Capons, 2 S. L. Wy., 1 W. Leghorn.
32	"	1	3	1	13	
33	"	......	......	12	......	5 Wh. Wy., 6 Wh. Orp., 1 Wh. P. R.
34	Barred Plymouth Rocks	......	......	1	24	
35	White Wyandottes	......	6	1	18	
36	Barred Plymouth Rocks	......	16	......	......	
37	White Wyandottes	1	16	......	......	
	Total	12	123	63	156	

EXPERIMENTAL FARM FOR THE MARITIME PROVINCES.

NAPPAN, N.S., November 30, 1905.

To DR. WM. SAUNDERS, C.M.G.,
Director Dominion Experimental Farms.
Ottawa.

SIR,—I have the honour to submit herewith my annual report of operations on the experimental farm for the maritime provinces at Nappan, N.S.

The past season, although much more satisfactory than the season of 1904, has not been all that might be desired for crop growing. Spring came in rather late, with continued wet weather, although no great amount of rainfall, which, although retarding seeding operations, proved quite favourable to the growth of hay and grass. From June 20, to about the same date in July the weather was about all that could be desired, and all crops made great growth during this period. From this to the end of the growing season the drouth became more and more pronounced, reducing somewhat the apparently assured heavy grain crops, and even more so in the case of roots that usually make such a great proportion of their growth after September 15, they making practically none after this date, left only a fair crop. Aftermath and pasture was particularly poor, while the new take of clover and grass, that early in the season gave good promise, were in most places seriously damaged.

Following the custom of applying the tuberculin test to the herds from time to time at the experimental farms, it was decided to apply this test, although no symptoms had occurred to awaken suspicion that any of the animals might be affected. Accordingly tuberculin was applied for to the department, and arrangements made with Dr. F. G. Hall, V.S., Amherst, N.S., to test the herd, which was done on May 18 and 19, with the result that a very large proportion reacted or were suspicious.

This report being submitted to yourself, instructions were received to dispose of none of the products of those affected animals, to isolate those shown to be healthy, and that arrangements would be made by the department to have them tested again when a sufficient number of months had elapsed to insure reliability of second test.

Accordingly the second test was made by Dr. J. Frink, V.S., St. John, N.B., on October 11 and 12, which resulted in practically the same finding as the previous test.

As a result of both tests, out of a total of 71 head tested, only 14 were found that did not react either in one or other of the tests, 8 others reacted in the former and not the latter test, leaving 49 head reacting in both tests, May 18 and 19, and October 11 and 12.

I wish again to acknowledge my indebtedness for valuable assistance rendered by Mr. J. Thomas Coates, farm foreman, who has kept all records of crop experiments, and to Mr. R. Donaldson, herdsman, who has kept all records of live stock experiments, each doing so in a careful and painstaking manner.

WEATHER.

December commenced dull and open, followed by cool, bright weather to the middle of the month, except on the 6th and 8th, when there was a light fall of snow. The balance of the month was more or less broken with light snowstorms. A snowfall on the 18th made fairly good sleighing, and on the 26th improved the going in sleighs, which continued to the end of the month. The thermometer went to zero on the 16th, and registered below zero at night, from the 22nd to the 27th 14° below zero, the lowest for the month was on the 27th, and on the 31st the mercury fell to 8° below zero.

January commenced with sleighing, which continued until the first of April. The first part of the month was somewhat broken by light snow storms, the latter part of the month, however, was noted for many heavy storms, some of which blocked the roads very badly. The thermometer registered below zero eleven times during the month, the lowest for some years being 31° below zero on the 15th.

The first week in February was fine, with the thermometer below zero much of the time. The remainder of February was also cold, but unusually stormy, with high winds. Roads were impassable much of the time, and railway traffic was suspended for several days. The mercury went below zero point at nine different dates during the month. Generally speaking, the month was the most stormy of any experienced here during the past 30 years.

The first of March opened mild, but was followed by cold, fine weather until the 8th. Snow then went rapidly for a few days, followed by exceptionally cold weather, the glass recording 14° and 15° below zero on the 14th and 15th respectively. The balance of March was fine, with some mild weather, and the large quantity of snow gradually went away without the usual freshets. Towards the last of the month the roads were bad and sleighing was about broken up.

The first of the month of April was fine and quite mild, with not nearly the usual amount of rain; this also assisted materially in preventing the usual spring freshets. The remainder of April was fine, with some light rains, but the sky was usually overcast, preventing many bright days. The total rainfall for the month was only 1·24 inches, of which 1·02 fell on the 21st and 22nd.

The rainfall during May was greater than usual, and was pretty well distributed over the whole month. Rain fell on eleven different dates during the month. The continued wet weather, together with a somewhat lower temperature than usual, prevented the usual amount of field work from being done, and made farm work and plant growth backward. The first seeding was done May 1. This, however, was followed by wet weather and the ground was not fit to work again until the 4th. Seeding was continued on the 5th and 6th, but on account of rain no seed was again sown until the 13th, when seeding continued uninterrupted to the 17th. The balance of May, after the 20th, was favourable for getting spring work done. Very high winds prevailed on the 25th and 26th. The thermometer registered frost on six different nights during the month.

On June 7, in the early morning, the thermometer registered 5° of frost. This frost did considerable damage to tender plants, also to fruits which were then in full bloom. The first part of June was more or less broken with showery weather. Rain is recorded on twelve different dates. Exceptionally fine weather prevailed from the 16th to 26th. The temperature was about the average during this month, and crops that had such a backward appearance early, forced rapidly ahead during the latter part of the month. Only once during the month did the temperature go above 78°, and that was on the 15th when 81° was registered.

The rainfall during July was light, and only on six dates did rain fall, which totalled only 1·56 inches. July was about as warm as usual, but was not so high in temperature as during the previous year. The crops made exceptionally good growth during the first part of the month, and the hay crop was above an average. The grain crops, however, suffered greatly for want of rain during the last of the month. The thermometer went to 80° or above on the 8th, 10th, 12th, 13th, 15th, 19th and 29th, when 81°, 82°, 82°, 80°, 80°, 83° and 81° was registered respectively.

August was unusually dry, the only rainfall during the month of any consequence, was on the 6th and 7th of ·62 inches, and on the 30th when ·59 inches fell. The total rainfall for the month was 1·53 inches. Grain crops were very materially reduced in yield, and root crops got a severe set back owing to the prolonged dry weather. The average temperature for the month was the same as the previous year. The thermometer registered 80° or above 80° on the 4th, 6th, 8th, 10th, 11th, 12th and 22nd, when 80°, 80°, 81°, 81°, 82° and 81° was registered respectively. On the early morning of the 15th the temperature fell to freezing point in some parts of the maritime provinces and did great damage to corn, potatoes, buckwheat and other tender plants. Our thermometer registered only 38°, six degrees from freezing.

The month of September was more or less broken with showery weather, the heaviest rainfalls, however, were registered on the 4th, 6th, 14th and 26th, when 1·33 inches of rain fell. The weather conditions outside of these days permitted of getting grain harvested in a satisfactory manner. No frosts were recorded here during September.

October was unusually dry and fine weather continued almost all of the month, the rainfall being only 1·29 inches in all. No frost was recorded up to the 11th and 12th, when 5° and 7° respectively were recorded. Frost was again recorded on the 23rd.

The month of November was also unusually fine most of the time, with frequent light rains up to the 15th, 16th and 17th, 2·10 inches falling on those dates. Dry weather then continued until the 29th, when 1·61 inches of rain fell. Very little frost was recorded in this month until the 15th, when the mercury fell to 5° below zero. From the 19th to 22nd slight frosts were recorded and from the 27th to the end of the month, frost was recorded each day, while on the 29th 54° was also recorded, being only one degree below the warmest record for the month.

Rainfall.

	1905.		1904.	
April	1·24	inches.	2·92	inches.
May	3·02	"	1·76	"
June	3·30	"	1·74	"
July	1·56	"	2·15	"
August	1·53	"	3·51	"
September	3·38	"	4·52	"
October	1·29	"	5·00	"
November	4·72	"	3·39	"
	20·04	"	24·99	"

METEOROLOGICAL RECORD.

The maximum and minimum thermometrical observations for the year beginning December 1, 1904, and ending November 30, 1905:—

Month.	Maximum.	Minimum.
1904.		
December	1st, 38° above zero	27th, 14° below zero.
1905.		
January	1st and 10th, 35° above zero	15th, 31° "
February	13th, 38° above zero.	6th, 18° "
March	30th, 50° "	15th, 15° "
April	29th, 66° "	3rd, 20° above zero.
May	29th, 73° "	13th, 22° "
June	15th, 81° "	7th, 27° "
July	19th, 83° "	3rd, 40° "
August	12th, 82° "	16th, 38° "
September	11th, 74° "	30th, 33° "
October	5th, 68° "	27th, 17° "
November	25th, 55° "	15th, 5° below zero.

EXPERIMENTS WITH OATS.

Experiments were again continued this year with the leading sorts of oats which were grown in uniform test plots of one-fortieth acre each. Thirty-nine varieties were included in this test. The plots received the same treatment and were on soil practically uniform throughout.

The ground was a clay loam, on which clover hay was grown the previous year

(1904). Grain in 1903 and roots in 1902 for which crop 20 one-horse cart loads of barnyard manure per acre was used. The land was ploughed in the fall and a very light crop of aftermath turned under. This spring it was harrowed with spring tooth, disc and smoothing harrows until a fine tilth was made. The seed was sown on May 15 with the seed drill at the rate of 2½ bushels per acre. This ground was also seeded down to clover and timothy at the rate of 7 lbs. Mammoth Red clover, 3 lbs. alsike and 12 lbs. timothy seed per acre, by means of a grass seed attachment to the grain seeder. The grain was selected heads of the previous season's crop, being cut from the various plots at harvest time.

No fertilizer was used on these plots this season. The grain started rather slowly and in some places weeds got somewhat of a start, grass seed and clover also started fairly well; although not growing fast this grain always retained quite a deep, dark colour and from about the first of June to the middle of July made very good growth, from this time until ripe, the continued dry weather had the effect of reducing the prospects of a large crop. The straw was stiff and very clean, with no rust whatever, but quite a few heads of smut were noticed. The following yields were obtained from these plots:—

OATS—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.		No. of Days Maturing.	Length of Straw, including Head.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.		Weight per measured Bushel after cleaning.	Smutted.
					Inches.	Inches.		Lbs.	Bush.	Lbs.	Lbs.	
1	Improved Ligowo....	Aug.	22	99	40 to 45	5 to 8	Branching..	5,600	92	32	35½	Slightly.
2	Mennonite..........	"	22	99	41 " 46	6 " 8	" ..	4,800	90	20	34	"
3	Twentieth Century...	"	22	99	42 " 46	6 " 8	" ..	4,840	85	30	36¼	"
4	Joanette............	"	22	99	40 " 44	6 " 9	" ..	5,400	83	18	34	"
5	Siberian............	"	28	105	42 " 46	6 " 9	" ..	4,680	82	12	33½	"
6	Thousand Dollar.....	"	23	100	40 " 45	6 " 8	" ..	4,680	80	0	36½	"
7	Black Beauty........	"	21	98	40 " 44	5 " 8	" ..	5,400	80	0	34½	"
8	Bavarian............	"	23	100	40 " 46	5 " 8	" ..	4,520	78	28	34	"
9	Pioneer.............	"	21	98	40 " 44	6 " 9	" ..	5,040	77	22	35	"
10	Sensation..........	"	22	99	40 " 45	5 " 7	– ..	4,680	77	2	37	"
11	Waverley...........	"	22	99	42 " 46	6 " 9	" ..	4,720	76	16	36	"
12	Lincoln............	"	23	100	42 " 46	6 " 8	" ..	4,600	75	30	35	"
13	Banner.............	"	22	99	42 " 46	6 " 9	" ..	4,800	75	10	34¼	"
14	Swedish Selected.....	"	22	99	40 " 46	6 " 8	" ..	4,600	74	4	37½	"
15	Improved American..	"	24	101	42 " 46	7 " 9	" ..	4,600	72	32	33¾	Badly.
16	Golden Giant........	"	26	103	40 " 46	8 " 11	Sided ...	3,320	72	32	30½	Slightly.
17	Buckbee's Illinois....	"	26	103	42 " 46	6 " 8	Branching..	3,640	70	20	36	"
18	Olive Black.........	"	28	105	40 " 45	6 " 9	Sided	3,480	70	0	36¼	"
19	Golden Beauty......	"	23	100	40 " 45	5 " 7	Branching..	4,280	69	14	34	"
20	Goldfinder..........	"	28	105	40 " 44	6 " 8	" ..	3,040	67	2	33	"
21	Danish Island	"	23	100	40 " 45	5 " 7	" ..	3,400	65	30	35	"
22	Golden Fleece.......	"	26	103	40 " 45	5 " 7	" ..	4,040	65	10	35	"
23	Holstein Prolific......	"	23	100	40 " 44	6 " 8	" ..	3,800	65	10	34½	"
24	Kendal White........	"	28	105	42 " 47	8 " 10	Sided	3,240	64	14	34¼	"
25	White Giant.........	"	23	100	40 " 43	5 " 7	Branching..	3,320	62	32	33½	"
26	Columbus............	"	24	101	40 " 45	5 " 7	" ..	2,520	62	32	34	"
27	Golden Tartarian....	"	29	106	38 " 42	7 " 10	Sided	3,800	62	12	32	"
28	American Beauty....	"	28	105	40 " 45	5 " 8	Branching..	3,280	61	6	34½	"
29	Abundance..........	"	23	100	42 " 46	6 " 9	" ..	4,400	58	28	33	"
30	American Triumph...	"	29	106	44 " 48	6 " 10	" ..	4,680	57	22	34¾	"
31	Storm King..........	"	23	100	42 " 47	6 " 9	Sided	3,600	57	22	36	"
32	Wide Awake	"	24	101	42 " 46	6 " 8	Branching..	3,680	56	16	35	Badly.
33	Irish Victor.........	"	23	100	40 " 44	5 " 8	" ..	3,600	56	16	34	"
34	Kendal Black........	"	28	105	42 " 46	7 " 10	Sided	3,880	55	10	37	Slightly.
35	Tartar King.........	"	23	100	41 " 45	6 " 8	"	3,000	50	20	37¼	Badly,
36	Milford Black........	"	26	103	40 " 46	7 " 10	"	3,000	47	2	37½	"
37	Milford White.......	"	26	103	38 " 42	6 " 9	"	3,920	46	16	37½	"
38	Early Golden Prolific.	"	26	103	42 " 46	5 " 8	Branching..	3,040	45	30	34	Slightly.
39	Scotch Potato......	"	23	100	40 " 44	5 " 8	" ..	3,080	45	30	33½	Badly.

EXPERIMENTS WITH BARLEY.

Eighteen varieties of six-rowed and fifteen varieties of two-rowed barley were sown in uniform plots on one-fortieth acre each, on May 16. The land was a clay loam that had been in clover hay the previous year (1904), in grain in 1903 and roots in 1902, for which crop barnyard manure at the rate of 20 one-horse cart loads per acre was used. No manure or fertilizer of any kind has been applied since. This land was ploughed in the autumn and a very light crop of aftermath turned under and was worked up in the spring with spring-tooth, disc and smoothing harrows, and sown with seed selected from the previous year's crop by cutting picked heads at harvest time.

The grain was sown with the seed drill at the rate of 2 bushels per acre, and at the same time there was also sown 7 lbs. Mammoth Red clover, 3 lbs. Alsike Clover and 12 lbs. Timothy seed per acre. The grain made rather slow growth for some time, but always retained a good healthy colour. Continued dry weather caused premature ripening. There was no rust, but some heads of smut. The following yields were obtained:—

Six-rowed Barley—Test of Varieties.

Number.	Name of Variety.	Date of ripening	No. of Days Maturing.	Length of Straw, including Head	Character of Straw.	Length of Head.	Weight of Straw.	Yield per Acre.		Weight per measured bushel after cleaning.
				Inches.		Inches.	Lbs.	Bush.	lbs.	Lbs.
1	Albert	Aug. 18	94	38 to 42	Stiff	2½ to 3	4,000	49	8	52¾
2	Brome	" 21	97	37 " 42	"	2 " 2½	4,120	49	8	48
3	Mensury	" 19	95	38 " 42	Medium	2 " 3	4,040	48	16	48
4	Common	" 17	93	36 " 41	Stiff	2 " 2½	3,240	47	24	50½
5	Stella	" 19	95	36 " 40	"	1¾ " 2½	3,880	45	..	51
6	Empire	" 18	94	36 " 40	"	2 " 3	3,480	41	32	50¾
7	Royal	" 17	93	35 " 38	"	1½ " 2½	4,000	39	8	51
8	Summit	" 19	95	36 " 40	"	1¾ " 2½	3,000	38	36	51¾
9	Champion	" 17	93	40 " 44	Medium	2 " 3	4,020	38	16	44
10	Argyle	" 18	94	37 " 42	Stiff	2½ " 3	2,920	37	24	49½
11	Trooper	" 17	93	35 " 38	"	1½ " 2½	3,200	34	28	51
12	Rennie's Improved	" 17	93	33 " 36	"	1½ " 2¼	3,640	34	28	50
13	Oderbruch	" 17	93	36 " 40	Medinm	2 " 3	3,620	34	8	50
14	Yale	" 17	93	35 " 38	Stiff	2 " 2½	3,080	33	16	50
15	Nugent	" 18	94	32 " 35	"	2 " 2½	2,520	31	32	49¾
16	Odessa	" 17	93	36 " 40	Medium	2 " 3	3,280	31	12	49
17	Claude	" 17	93	33 " 36	Stiff	1½ " 2	2,480	31	12	50
18	Mansfield	" 19	95	37 " 39	"	1½ " 2½	2,680	30	40	51½

TWO-ROWED BARLEY—TEST OF VARIETIES.

Number.	Name of Variety.	Date of ripening	No. of Days Maturing.	Length of Straw, including Head	Character of Straw.	Length of Head.	Weight of Straw.	Yield per Acre.		Weight per measured bushel after cleaning.
				Inches.		Inches.	Lbs.	Bush.	lbs.	Lbs.
1	French Chevalier.....	Aug. 19	95	32 to 37	Medium....	3 to 4	3,880	44	28	52½
2	Beaver................	" 19	95	32 " 38	"	2 " 3¼	3,200	43	16	52½
3	Danish Chevalier.......	" 19	95	30 " 36	"	3 " 4	4,040	42	44	53
4	Harvey..............	" 19	95	40 " 43	Stiff........	2 " 3½	4,080	39	8	51¼
5	Newton...............	" 19	95	38 " 42	"	2 " 3	3,600	38	36	51
6	Logan...............	" 19	95	40 " 44	"	2 " 3	3,880	38	16	50
7	Jarvis................	" 19	95	40 " 44	"	2 " 3	3,720	36	32	50¾
8	Gordon...............	" 19	95	36 " 40	"	2 " 3	3,080	35	40	50½
9	Invincible............	" 21	97	30 " 34	"	2 " 3	3,160	35	20	48
10	Sidney................	" 18	94	36 " 41	"	2 " 3	4,000	35	..	52½
11	Dunham..............	" 19	95	36 " 41	"	2 " 3	3,800	34	28	51½
12	Canadian Thorpe......	" 21	97	40 " 45	"	2 " 3	3,680	34	8	51½
13	Clifford................	" 19	95	35 " 40	"	2 " 3	2,600	33	16	50½
14	Swedish Chevalier......	" 21	97	26 " 30	Medium....	3 " 5	3,000	25	20	50½
15	Standwell.............	" 21	97	36 " 40	Stiff........	2 " 3	2,440	25	..	48½

EXPERIMENTS WITH SPRING WHEAT.

Twenty-eight varieties of spring wheat were sown in plots one-fortieth acre each, on land that was a light sandy loam, and had been in clover hay the previous season, grain in 1903 and roots in 1902, for which crop 20 one-horse cart loads of stable manure was used. The land was ploughed in the autumn and a light crop of second-growth clover turned under. This spring this was well worked up with spring tooth and smoothing harrows, and sown with the drill seeder May 13, at the rate of 1¾ bushels per acre, together with Mammoth Red Clover 7 lb., Alsike Clover 3 lb., and Timothy seed 12 lb.

Owing to the continued cold and wet weather this crop made rather a poor start and weeds made fairly good headway, which had a decided influence on the result. No rust was observed but some smut was noticed. The following yields were obtained:—

SPRING WHEAT—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw, including head.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw	Yield per Acre.		Weight per measured bushel after cleaning.
		1905.		Inches.		Inches.		Lbs.	Bush.	Lbs.	
1	Pringle's Champlain..	Aug. 25..	104	38-43	Stiff......	2 -3½	Bearded..	4,120	35	..	63¼
2	Monarch	" 29..	108	40-45	"	2½-3¾	Beardless.	3,480	34	40	61½
3	Preston..	" 25..	104	36-42	"	2½-3¼	Bearded..	3,720	34	..	63
4	Bishop	" 25..	104	36-40	"	2 -2½	Beardless.	3,560	32	..	62
5	Colorado	" 25..	104	40-43	"	2 -3	Bearded..	3,880	31	20	63
6	Stanley.............	" 28..	107	40-44	"	2½-3½	Beardless.	3,640	30	40	61½
7	McKendry's Fife.....	" 29..	108	40-44	"	2½-3½	" ..	3,080	30	40	61
8	Laurel............	" 29..	108	40-44	"	2½-3½	" ..	3,600	30	..	60
9	Hungarian White....	" 25..	104	36-40	"	2 -3	Bearded ..	2,880	29	..	62
10	Hayne's Blue Stem...	" 30..	109	36-40	"	2 -3	Beardless.	2,920	28	20	62
11	Advance............	" 25..	104	38-42	"	2 -3	Bearded..	3,400	28	..	62
12	White Fife	" 29..	108	40-44	"	2 -3½	Beardless.	3,800	27	40	62
13	Clyde	" 29..	108	40-45	"	2½-3½	" ..	3,200	27	20	61½
14	Power's Fife.........	" 30..	109	38-42	"	2 -3	" ..	3,920	27	..	62
15	Wellman's Fife	" 29..	108	40-45	"	2½-4	" ..	3,860	26	40	61
16	Australian No. 9.....	" 31..	110	36-40	"	2 -3	" ..	2,400	26	..	59½
17	Countess	" 29..	108	36-42	"	2 -3	" ..	2,520	26	..	61
18	Dawn	" 26..	105	38-42	"	2 -3	" ..	2,800	25	20	61¾
19	Weldon	" 30..	109	39-42	"	2 -3	" ..	2,280	25	..	61
20	Red Fife	" 28..	107	38-42	"	2 -3	" ..	2,560	24	40	60¼
21	White Russian	" 29..	108	38-43	"	2 -3½	" ..	2,520	24	..	59½
22	Red Fern...........	" 26..	105	34-38	"	2 -3	Bearded..	2,280	20	40	62½
23	Minnesota No. 163...	" 30..	109	40-42	"	2 -3½	Beardless.	2,200	20	20	60¾
24	Percy	" 30..	109	40-44	"	2 -3	" ..	3,080	20	..	60¾
25	Chester	" 31..	110	36-40	"	2 -3	" ..	2,520	20	..	61½
26	Huron..............	" 25..	104	36-40	Medium..	2 -3	Bearded..	2,280	18	..	61
27	Early Riga..........	" 22..	101	30-35	" ..	2 -3	Beardless.	2,000	14	..	62
28	Herisson Bearded.....	" 25..	104	30-35	Weak....	1½-2	Bearded..	2,020	13	20	63

EXPERIMENTS WITH MACARONI WHEAT.

Four varieties of Macaroni wheat were grown in plots of one-fortieth acre each, alongside of the other wheat plots. The land was similar in character and received the same treatment as in the wheat plots and was sown at the same time (May 13). These varieties are separated from the other wheats on account of their inferior milling qualities. The following are the yields obtained:—

MACARONI WHEAT—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw, including head.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw	Yield per Acre.		Weight per measured bushel after cleaning.
		1905.		Inches.		Inches.		Lbs.	Bush.	Lbs.	Lbs.
1	Roumanian..........	Aug. 30..	109	38-42	Medium..	2 -2½	Bearded..	2,280	22	..	62¾
2	Goose.........	" 29..	108	34-40	" ..	1½-2	" .	1,720	17	20	63
3	Yellow Gharnovka...	" 29..	108	35-41	" ..	1½-2	" ..	2,320	16	40	62½
4	Mahmoudi..........	" 29..	108	35-38	" ..	2 -2½	" ..	1,800	14	..	62¾

EXPERIMENTS WITH EMMER AND SPELT.

Two varieties each of Emmer and Spelt were sown May 13 in plots of one-fortieth acre each. The land was similar to that on which the other wheats were sown and received the same treatment. The yield from these plots is given in pounds, as with the ordinary threshing the chaff is not separated from the kernels as in other grain and cannot well be compared with the other sorts which are threshed clean.

EMMER AND SPELT—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw, including head.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.
		1905.		Inches.		Inches.		Lbs.	Lbs.
1	Red Spelt	Sept. 2	112	38–43	Stiff	2 –3	Beardless.	3,600	2,440
2	White Spelt	" 2	112	34–41	"	2 –4	"	3,000	2,360
3	Red Emmer	Aug. 31	110	35–40	"	2 –3	Bearded	2,200	1,120
4	Common Emmer	" 31	108	32–38	"	1½–2	"	2,400	2,400

EXPERIMENTS WITH FIELD PEASE.

Thirty varieties of pease were sown in uniform plots of one-fortieth acre each, on a clay loam. This was in a poor state of fertility, having been in pasture for many years and no fertilizer having been applied for at least ten years. The land was ploughed in the fall and worked up this spring with disc and spring-tooth harrows, and sown with the drill seeder at the rate of from 2 to 3 bushels per acre, Mammoth Red clover being sown at the same time at the rate of 10 lbs. per acre.

The following yields per acre was obtained:—

PEASE—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	Number of Days Maturing.	Character of Growth.	Length of Straw.	Length of Pod.	Size of Pea.	Yield per Acre.		Weight per Bushel.
					Inches.	Inches.		Bush.	Lbs.	Lbs.
1	Mummy	Sept. 9	109	Medium	36–40	1½–2	Medium	39	20	63½
2	Nelson	" 9	109	"	30–40	1½–2¼	"	38	..	63½
3	English Gray	" 14	114	Good	37–42	2 –2½	"	37	20	60½
4	White Marrowfat	" 11	111	"	36-42	2 –3	Large	35	40	63¾
5	Paragon	" 2	102	Medium	30–35	1½–2	Medium	34	20	63
6	White Wonder	" 2	102	"	30–36	1½–2	"	34	..	63½
7	Black Eye Marrowfat	" 11	111	Good	36–42	2 -3	Large	34	..	62
8	Duke	" 13	113	Medium	34–38	2 –2½	"	32	..	62
9	Chancellor	" 12	102	"	29-33	1 –2	Small	31	40	64
10	Picton	" 11	111	Good	34–38	2 –2½	Medium	31	20	63½
11	Prince Albert	" 12	112	Medium	35-40	1½–2	Small	31	..	62½
12	Arthur	" 2	102	"	28–32	1½–3	Medium	30	40	62¼
13	Daniel O'Rourke	" 9	109	"	33-37	1½–2	Small	30	..	64
14	Golden Vine	" 11	111	Good	33–37	1½–2	"	30	..	63
15	Pride	" 11	111	Medium	34–35	1½-2	Medium	28	20	63
16	German White	" 6	106	Good	34–38	1½–2½	"	28	..	63½
17	Carleton	" 11	111	"	34–40	2 –2½	"	26	40	63½
18	Gregory	" 11	111	"	35–40	1½-2½	"	26	40	62½
19	Mackay	" 14	114	"	38–42	2 -3	Large	26	20	63
20	Crown	" 2	102	"	30–36	1½–2	Small	26	..	64
21	Wisconsin Blue	" 11	111	"	34–38	1½–2½	Medium	26	..	64½
22	Pearl	" 14	114	Medium	30–34	2 –2½	"	25	40	62
23	Kent	" 11	111	Good	36–41	2 –2½	Large	25	20	63
24	Prussian Blue	" 9	109	Medium	33–38	1½–2	Small	24	40	63
25	Agnes	" 12	112	Good	38–44	2 –3	Large	24	40	62¼
26	Archer	" 13	113	"	34–38	2 –2½	Medium	24	20	63
27	Prince	" 11	111	"	36–40	2 –2½	"	24	..	62
28	Early Britain	" 6	106	"	33–36	2 –3	Large	24	..	62
29	Macoun	" 14	114	"	38–43	2 –2½	"	19	20	62¾
30	Victoria	" 12	112	"	36-40	2 –2½	"	15	20	62

EXPERIMENTS WITH BUCKWHEAT.

Five varieties of buckwheat were sown in uniform test plots of one-fortieth acre each. They were sown June 20, and cut September 1 and 2. The land was a clay loam that had been in clover and timothy the previous season. This land had received a dressing of barnyard manure in 1902, when a crop of roots was grown. No fertilizer of any kind was used since. The sod was ploughed in the fall of 1904 and worked up well this spring. The following yields were obtained:—

BUCKWHEAT.

Number.	Name of Variety.	Date of Sowing.		Date of Ripening.		No. of days Maturing.	Length of Straw.	Character of Straw.	Yield per Acre.		Weight per Bushel.
							Inches.		Bush.	Lbs.	Lbs.
1	Siberian or Tartarian.......	June	20	Sept.	1	73	28–32	Stiff......	43	16	50
2	Rye Buckwheat.......	"	2	"	2	74	36–40	"	37	24	51
3	Gray Buckwheat............	"	2	"	2	74	32–36	"	32	24	48
4	Japanese................ ...	"	2	"	1	73	36–42	"	25	40	43
5	Silverhull..................	"	2	"	2	74	32–36	"	24	28	50

FIELD CROPS OF GRAIN.

Seventeen acres of field grain was grown. Ten acres of which was in plots of two acres each, the remaining seven acres in one lot. The land was a clay loam, the previous crop having been roots and corn, for which crop barnyard manure at the rate of 20 tons per acre was used. The plots ran crosswise of the field, the roots and corn plots having been run lengthwise of the field the previous year, consequently each grain plot was on the like amount of root and corn land. The land was ploughed in the spring and well harrowed, after which the grain was sown with the seed drill and with 3 bushels in the case of oats, 2 bushels in the case of barley and 3 bushels in the case of mixed grain, Mammoth Red clover at the rate of 7 lbs.; Alsike clover, 3 lbs., and Timothy seed 12 lbs. per acre was sown with this crop. The following is the crop harvested:—

FIELD CROPS OF GRAIN.

Crops.	Yield per Acre.		Weight per Bushel.
	Bush.	Lbs.	Lbs.
2 Acres Odessa Barley sown May 29, cut Aug. 23..........	39	12	48
2 Acres Mixed Grain sown May 29, cut Aug. 24...........	53	20	40
2 Acres Sensation Oats sown May 29, cut Aug. 29........................	62	2	34
2 Acres Waverley Oats sown June 1, cut September 5......	59	14	34
2 Blk. Tartarian Oats sown June 1, cut September 8.....	43	17	34
7 Acres Mixed Grain sown June 5, cut Sept. 5..............................	42	0	40

FIELD CROPS OF MIXED GRAIN.

Eight acres was sown with mixed oats, barley and pease. The land was a clay loam in a very poor state of fertility, not having received manure or fertilizer of any kind for at least ten years. This crop was sown May 6 and cut August 23. The yield was 30 bushels, 15 lbs. per acre, weighing 40 lbs. per bushel.

Five acres mixed grain was grown. The land was a light clay loam. The previous crop was buckwheat, for which crop barnyard manure at the rate of 10 tons per acre was spread on the surface in the winter of 1904. The land was ploughed in the fall. The crop was sown May 27 and cut August 31; Mammoth Red clover at the rate of 7 lbs., Alsike clover, 3 lbs. and Timothy seed, 12 lbs. per acre, was sown with this crop. The following is the yield obtained: 33 bushels, 6 lbs. per acre, which weighed 40 lbs. per bushel.

Three acres of mixed grain were sown on a clay loam field, that had previously been in clover a light second crop having been turned under in the fall of 1904. The ground was well worked up in the spring and sown May 17, cut August 21. With this crop was sown Mammoth Red clover at the rate of 7 lbs., Alsike 3 lbs. and Timothy seed, 12 lbs. per acre. This field gave a yield of 61 bushels per acre at 40 lbs. per bushel.

EXPERIMENTS WITH INDIAN CORN.

Twenty varieties of Indian corn were sown in rows 36 inches apart, and also in hills 36 inches apart each way. The land was a clay loam that had been manured in 1900, for a root crop grown that year, followed with grain, 1901; clover hay, 1902; grain again, 1903, and clover hay again in 1904. Stable manure at the rate of about twenty tons per acre was spread on the sod in the fall of 1904, and was ploughed under together with a heavy crop of grass. Early in June, just before planting, this was worked up into a good condition of tilth, when complete fertilizer at the rate of 300 lbs. per acre was sown broadcast and harrowed in. The corn was planted June 9, by hand machine. When the plants were about 6 inches high they were thinned out, leaving them from 4 to 6 inches apart in the rows, and from 5 to 8 plants in each hill. The land was gone over with a very light harrow before the plants came up, and three times with the Breed weeder in the next two weeks, and three times with the cultivator.

From the first this crop made very satisfactory growth, and at 60 days from coming through the ground, measured in many places 90 inches in height. The latter part of the season was not so favourable for growth. The following yields were obtained:—

INDIAN CORN—TEST OF VARIETIES.

Number.	Name of Variety.	Height.	When Tasselled.	In Silk.	Condition when cut.	Weight per acre grown in rows.		Weight per acre grown in hills.	
		Inches.				Tons.	Lbs.	Tons.	Lbs.
1	Thoroughbred White Flint	93	Sept. 1	....	Tasselled	30	1,600	24	1,500
2	Eureka	96	....	....	"	29	850	25	1,150
3	Red Cob Ensilage	98	....	....	"	28	1,200	26	800
4	Salzer's All Gold	98	....	....	"	27	670	24	1,170
5	Pride of the North	100	Sept. 1	....	"	27	450	26	1,900
6	Longfellow	80	Aug. 22	Sept, 1	Late milk	26	20	22	1,100
7	Early Mastodon	97	Sept. 1	....	Early milk	25	1,700	18	1,050
8	Selected Leaming	94	" 1	....	"	24	1,830	22	550
9	Giant Prolific Ensilage	96	....	....	Tasselled	24	950	21	130
10	Cloud's Early Yellow	100	....	....	"	24	70	20	1,470
11	Evergreen Sugar	88	Sept. 1	....	"	23	1,850	25	1,370
12	Early Butler	92	" 1	....	Early milk	23	1,520	21	570
13	Angel of Midnight	80	Aug. 22	Sept. 1	Late milk	22	1,460	21	350
14	Compton's Early	80	" 22	" 1	"	22	1,320	22	220
15	North Dakota White	82	" 26	" 5	In milk	22	1,100	23	200
16	King Philip	85	" 26	" 10	Watery	22	770	21	900
17	Mammoth Cuban	96	" 29	....	Tasselled	22	770	20	370
18	Superior Fodder	94	Sept. 20	....	"	22	250	19	1,270
19	Champion White Pearl	102	" 20	....	"	20	150	19	1,050
20	White Cap Yellow Dent	94	" 20	....	"	18	1,400	18	300

INDIAN CORN SOWN AT DIFFERENT DISTANCES APART.

Experiments were again carried on this year with corn planted at different distances apart. The land was similar to that in the uniform test plots, and had the same treatment. Three varieties were used. The corn was planted June 9 and cut September 27. The following table gives the names of the varieties used, the distances apart in the rows, and the yield obtained. The plots were one-fortieth acre each:—

Name of Variety.	Distance Apart.	Yield per acre.	
	Inches.	Tons.	Lbs.
Champion White Pearl	42	14	300
" "	35	17	200
" "	28	15	200
" "	21	13	100
Selected Leaming	42	16	200
" "	35	16	900
" "	28	16	300
" "	21	14	740
Longfellow	42	20	1,500
"	35	22	1,100
"	28	21	500
"	21	18	460

FIELD CROP OF INDIAN CORN.

Three acres of Indian corn was grown in six plots of one-half acre each. The land was a clay loam in a good state of fertility, and had been in clover hay the previous year. For five of these plots the aftermath was left growing until early in June. Manure at the rate of 20 tons per acre had been spread on the grass as early as possible in the spring, and early in June this was ploughed under along with a heavy crop of grass. One plot of one-half acre was ploughed last fall and manure spread on it at the rate of 20 tons per acre this spring, and well worked in with the spade harrow before sowing, the object being to compare the results of these two methods of treatment. The variety known as Longfellow was used for this latter plot.

To one-half acre each of Compton's Early and Dakota White was added commercial fertilizer at the rate of 250 lbs. per acre, another half acre of each was left with manure alone. After ploughing, this was well worked up with disc, springtooth and smoothing harrows and sown in rows 35 inches apart with the drill seeder on June 9. The land was gone over once with a light smoothing harrow before the corn came up and cultivated with the Breed weeder and one-horse cultivator six times throughout the summer. This crop made very satisfactory growth. The following table shows the results:—

FIELD CROP OF CORN—FERTILIZER EXPERIMENT.

Name of Variety, how Fertilized, size of Plot.		Yield per Acre.	
		Tons.	Lbs.
North Dakota White.			
½ acre—Manure 20 tons, commercial fertilizer 250 lbs. per acre		18	1,860
½ " Manure only		17	1,460
Cost of commercial fertilizer at $30 per ton	$ 3.75 per acre.		
Value of gain in crop over manure only, 1 ton 400 lbs. per acre at $2 per ton	2.40 "		
Loss	$ 1.35 "		
Compton's Early.			
½ acre—Manure 20 tons, commercial fertilizer 250 lbs. per acre		17	1,850
½ " Manure only		17	350
Cost of commercial fertilizer at $30 per ton	$ 3.75 per acre.		
Value of gain in crop, 1,500 lbs. at $2 per ton	1.50 "		
Loss	$ 2.25 "		
FALL VERSUS SPRING PLOUGHING.			
Longfellow.			
½ acre—Ploughed in Fall		20	1,880
½ " Ploughed in Spring		18	290

EXPERIMENTS WITH TURNIPS.

Twenty varieties of turnips were sown this year on a clay loam soil that had been manured for roots in the season of 1900. Grain was grown in 1901, clover 1902, with the second crop turned under and grain again in 1903. Clover in 1904, the aftermath of this crop was ploughed under early last fall and cultivated twice with spade harrow. In the spring this was again cultivated with spring tooth and disc harrows. Barnyard manure was then spread on with a manure spreader at the rate of 20 tons per acre, and ploughed under and again thoroughly cultivated. Complete fertilizer at the rate of 500 lbs. per acre was then sown broadcast and harrowed in with the smoothing harrow. Rows were made 24 inches apart and the plants thinned out to one foot apart in the rows. The yield was calculated from the weight obtained from two rows each 66 feet long. The first plots were sown May 26, and a duplicate lot sown June 9, and all pulled October 16. Until about October 1 this crop appeared to be particularly good, but made little increase after that date, owing to severe and continued drouth. The following were the results obtained:—

TURNIPS—TEST OF VARIETIES.

Number.	Name of Variety.	Yield per Acre. — 1st Plot.		Yield per Acre. — 1st Plot.		Yield per Acre. — 2nd Plot.		Yield per Acre. — 2nd Plot.	
		Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
1	Magnum Bonum	43	944	1,449	4	37	632	1,243	52
2	Perfection Swede	41	688	1,378	8	29	1,128	985	28
3	Empire Swede	41	80	1,368		29	1,888	998	8
4	Hartley's Bronze	40	1,624	1,360	24	28	1,456	957	36
5	Carter's Elephant	40	256	1,337	36	22	1,904	965	4
6	Skirvings	39	1,344	1,322	24	27	1,328	922	8
7	Good Luck	39	1,040	1,317	20	28	240	937	20
8	Drummond Purple Top	39	888	1,314	48	24	1,248	820	48
9	East Lothian	39	584	1,309	44	25	1,984	866	24
10	Selected Purple Top	39	432	1,307	12	26	440	874	
11	Jumbo	38	1,824	1,297	4	31	776	1,046	16
12	Hall's Westbury	37	1,848	1,264	8	28	696	944	56
13	Bangholm Selected	37	328	1,238	48	31	624	1,043	44
14	Kangaroo	35	1,896	1,198	16	28	392	939	52
15	Elephant's Master	35	1,592	1,193	12	31	116	1,035	16
16	Mammoth Clyde	35	1,288	1,188	8	28	1,000	950	
17	Halewood's Bronze Top	35	832	1,180	32	28	1,304	955	4
18	Imperial Swede	35	376	1,172	56	27	1,936	923	16
19	New Century	34	1,008	1,150	8	26	488	874	48
20	Sutton's Champion	34	400	1,140		28	1,000	950	

FIELD CROPS OF TURNIPS.

Two and a half acres of turnips were sown in two lots of one acre each, and one lot of one-half acre. The land was a clay loam in a good state of fertility. The previous crop had been clover hay. The sod was ploughed in the fall and well worked up; it was again well worked up in the spring, and manure at the rate of 20 tons per acre spread on and ploughed under, it was then gone over with spring-tooth and disc harrows.

Each acre was divided into three parts, to one-third was added commercial fertilizer at the rate of 500 lbs. per acre, to another third at the rate of 250 lbs. per acre, and one-third left with manure alone, this was spread on the surface and harrowed in with the smoothing harrow, after which rows were run 26 inches apart, and the seed sown June 7. This crop grew exceptionally well until the early autumn, when the continued extremely dry weather retarded the growth considerably. The crop was harvested Nov. 4 and 6, with the following results:—

FIELD CROP OF TURNIPS.

Name of Variety, how Fertilized, size of Plot, and date pulled.		Yield per Acre.		Yield per Acre.	
		Tons.	Lbs.	Bush.	Lbs.
Kangaroo—(Pulled November 6).					
⅕ acre—Manure 20 tons, fertilizer 500 lbs. per acre		29	1,685	994	45
⅛ " " 20 " " 250 "		29	125	968	45
⅓ " " 20 " only		28	655	944	15
Cost per acre of 500 lbs. commercial fertilizer at $30 per ton	$7 50				
Value per acre of gain in crop over manure only 50½ bush. at 6c. per bush.	3 03				
Loss per acre	$4 47				
Cost per acre of 250 lbs. commercial fertilizer at $30 per ton	3 75				
Value per acre of gain in crop over manure only 24½ bush. at 6c. per bush.	1 47				
Loss per acre	$2 28				
Best of All—(Pulled November 6.)					
⅛ acre—Manure 20 tons, fertilizer 500 lbs. per acre		26	1,700	895	..
⅛ " " 20 " " 250 "		25	925	848	45
⅛ " " 20 " only		25	700	845	..
Cost per acre of 500 lbs. commercial fertilizer at $30 per ton	$7 50				
Value per acre of gain in crop over manure only 50 bush. at 6c.	3 00				
Loss per acre	$4 00				
Cost per acre of 250 lbs. commercial fertilizer at $30 per ton	3 75				
Value per acre of gain in crop over manure only 3¾ bush. at 6c.	0 23				
Loss per acre	$3 52				
Hartley's Bronze—(Pulled November 4).					
¼ acre—Manure 20 tons, fertilizer 500 lbs. per acre		29	1,520	992	
¼ " " 20 " only		29	968	982	
Cost per acre of 500 lbs. fertilizer at $30 per ton	$7 50				
Value per acre of gain in crop over manure only 9⅓ bush. at 6c.	0 56				
Loss per acre	$6 94				

Six acres of turnips were also grown in lots of one acre each. This land varied very much, containing heavy clay loam, black muck, and sandy loam. These varieties of soil ran across the field, while the plots ran the other way. This land was in grain, 1904, hay, 1903, and was in rather a poor state of fertility. It was ploughed in the fall, worked up well this spring, after which barnyard manure at the rate of 20 tons per acre was applied with the manure spreader, after which the land was ploughed again and worked up well and sown in drills 26 inches apart. Six varieties were used. Different quantities of commercial fertilizers were used to different parts of each acre. The following table gives the particulars:—

FIELD CROP OF TURNIPS—*Concluded.*

Name of Variety, how Fertilized, size of Plot, and date pulled.		Yield per Acre.		Yield per Acre.	
		Tons.	Lbs.	Bush.	Lbs.
Sutton's Champion—(Pulled October 30).					
⅓ acre—Manure 20 tons, bone 500 lbs. per acre		24	660	811	..
⅓ " " 20 " slag 500 "		25	520	842	..
⅓ " " 20 " no other fertilizer		24	1,080	818	..
Cost per acre of 500 lbs. bone at $30 per ton	$7 50				
Value per acre of gain in crop over manure only, 7 bush. at 6c.	0 42				
Loss per acre	$7 92				
Cost per acre of 500 lbs. slag at $21 per ton	5 25				
Value per acre of gain in crop over manure only 24 bush. at 6c.	1 44				
Loss per acre	$3 81				
Kangaroo—(Pulled October 31).					
⅓ acre—Manure 20 tons, fertilizer intense 500 lbs. per acre		24	570	809	30
⅓ " " 20 " slag 500 "		24	480	808	..
⅓ " " 20 " no other fertilizer		23	1,190	786	30
Cost per acre of 500 lbs. intense fertilizer at $35 per ton	$8 75				
Value per acre of gain in crop over manure only 23 bush. at 6c.	1 38				
Loss per acre	$7 37				
Cost per acre of 500 lbs. slag at $21 per ton	5 25				
Value per acre of gain in crop over manure only 21½ bush. at 6c.	1 29				
Loss per acre	$3 97				
Best of All—(Pulled November 1).					
⅓ acre—Manure 20 tons, fertilizer intense 500 lbs. per acre		20	1,580	693	..
⅓ " " 20 " " 250 "		20	926	682	6
⅓ " " 20 " no other fertilizer		19	1,030	650	30
Cost per acre of 500 lbs. intense fertilizer at $35 per ton	$8 75				
Value per acre of gain in crop over manure only 42 bush. at 6c.	2 52				
Loss per acre	$6 23				
Cost per acre of 250 lbs. intense fertilizer at $35 per ton	4 38				
Value per acre of gain in crop over manure only 58 bush. at 6c.	3 48				
Loss per acre	$0 90				
Hartley's Bronze Top—(Pulled November 2).					
⅓ acre—Manure 20 tons, fertilizer intense 500 lbs. per acre		24	1,440	824	..
⅓ " " 20 " " " 250 "		24	1,710	828	30
⅓ " " 20 " no other fertilizer		23	200	770	..
Cost per acre of 500 lbs. intense fertilizer at $35 per ton	$8 75				
Value per acre of gain in crop over manure only 54 bush. at 6c.	3 24				
Loss per acre	$5 51				
Cost per acre of 250 lbs. intense fertilizer at $35 per ton	4 38				
Value per acre of gain in crop over manure only 58 bush. at 6c.	3 48				
Loss per acre	$0 90				
Magnum Bonum—(Pulled October 28).					
⅓ acre—Manure 20 tons, bone 500 lbs. per acre		21	1,320	720	..
⅓ " " 20 " ashes 500 "		21	990	716	30
⅓ " " 20 " no other fertilizer		21	870	714	30
Cost per acre of 500 lbs. bone at $30 per ton	$7 50				
Value per acre of gain in crop over manure only 5½ bush. at 6c.	0 33				
Loss per acre	$7 17				
Empress—(Pulled October 23).					
1 acre—Manure 20 tons		19	1,600	660	..

EXPERIMENTS WITH MANGELS.

Seventeen varieties of mangels were sown in uniform test plots. The land was a clay loam manured in 1900 for roots, followed by grain in 1901, clover and timothy in 1902, grain again in 1903, and clover hay in 1904. It was ploughed early last fall, and a light coat of aftermath turned under, it was cultivated twice before winter and again in the spring. Barnyard manure was then spread with the manure spreader at the rate of 20 tons per acre; and ploughed under and again cultivated thoroughly. Complete fertilizer at the rate of 500 lbs. per acre was then sown broadcast and harrowed in with the smoothing harrow. Rows were made 24 inches apart, rolled down and sown with the Planet Jr. hand seed drill, in bunches, 12 inches apart in the row and from 4 to 8 seeds in a bunch. When about 3 to 4 inches high they were thinned out, leaving one plant in each spot. Two sowings were made of each variety, the first sowing was on May 25 and the second on June 8. The mangels were all pulled on October 12. The yield was calculated in each case from the weight of roots gathered from two rows each 66 feet long. The following were the yields obtained:—

Number.	Name of Variety.	Yield per Acre. 1st Plot.		Yield per Acre. 1st Plot.		Yield per Acre. 2nd Plot.		Yield per Acre. 2nd Plot.	
		Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs	Bush.	Lbs.
1	Mammoth Yellow Intermediate	31	1,992	1,066	32	26	744	879	4
2	Half Long Sugar White	31	1,688	1,061	28	21	256	704	16
3	Prize Mammoth Long Red	31	776	1,046	16	21	104	701	44
4	Lion Yellow Intermediate	30	1,104	1,018	24	19	1,824	663	44
5	Giant Yellow Intermediate	30	648	1,010	48	23	360	772	40
6	Giant Yellow Globe	29	1,888	998	8	25	8	833	28
7	Selected Yellow Globe	28	1,000	950	0	25	920	848	40
8	Yellow Intermediate	28	392	939	52	19	760	646	..
9	Prize Winner Yellow Globe	27	1,632	927	12	19	1,976	666	16
10	Half Long Sugar Rosy	27	1,328	922	8	20	280	671	20
11	Selected Mammoth Long Red	27	416	906	56	18	1,544	625	44
12	Triumph Yellow Globe	26	896	881	36	21	1,016	716	56
13	Ideal	25	8	833	28	21	560	709	20
14	Leviathan Long Red	24	1,704	828	24	15	1,920	532	..
15	Mammoth Long Red	24	1,400	823	20	18	1,848	630	48
16	Giant Sugar	24	32	800	32	17	352	572	32
17	Gate Post	23	1,272	787	52	16	72	534	32

FIELD CROPS OF MANGELS.

Two and a half acres of mangels were grown in two lots of one acre each, and one lot of one-half acre. Three varieties were used, Yellow Globe, Yellow Intermediate and Mammoth Long Red. The land was a clay loam, in a good state of fertility. The previous crop was clover hay. The sod was ploughed in the early fall and worked up twice with the spade harrow. In the spring it was again well worked up, after which barnyard manure was spread on with the manure spreader at the rate of 20 tons per acre, and ploughed under; this was then well worked up. To one-third of each acre was added commercial fertilizer at the rate of 500 lbs. per acre, to another third at the rate of 250 lbs. per acre, and one-third left with manure alone. The mangels were sown in drills 26 inches apart. They were sown June 1, and harvested October 10 to 14. The following yield was obtained:—

Name of Variety, how Fertilized, Size of Plot, Date Pulled.		Yield per Acre.		Yield per Acre.	
		Tons.	Lbs.	Bush.	Lbs.
Yellow Intermediate—(Pulled October 13).					
⅓ acre, manure 20 tons, fertilizer 500 lbs. per acre		21	1,200	720	..
⅓ " " 250 "		24	180	803	..
⅓ " " no other fertilizer		22	820	747	..
Cost per acre of 500 lbs. fertilizer at $30 per ton	$7 50				
Value per acre of gain in crop over manure only, 27 bush. at 6 cts	1 62				
Loss per acre	$9 12				
Cost per acre of 250 lbs fertilizer at $30 per ton	$3 75				
Value per acre of gain in crop over manure only, 56 bush. at 6 cts	3 36				
Loss per acre	$0 39				
Yellow Globe—(Pulled October 10).					
⅓ acre, manure 20 tons fertilizer 500 lbs. per acre		22	700	745	..
⅓ " " 250 "		21	75	701	15
⅓ " " no other fertilizer		20	1,250	687	30
Cost per acre of 500 lbs. fertilizer at $30 per ton	$7 50				
Value per acre of gain in crop over manure only, 57½ bush. at 6 cts	3 45				
Loss per acre	$4 05				
Cost per acre of 250 lbs. fertilizer at $30 per ton	$3 75				
Value per acre of gain in crop over manure only, 13¾ bush. at 6 cts	$0 83				
Loss per acre	$2 92				
Mammoth Long Red—(Pulled October 14).					
¼ acre, manure 20 tons, fertilizer 500 lbs. per acre		20	1,360	689	20
¼ " " 20 tons, no other fertilizer		19	400	640	..
Cost per acre of 500 lbs. fertilizer at $30 per ton	$7 50				
Value per acre of gain in crop over manure only, 49⅓ bush. at 6 cts	2 96				
Loss per acre	$4 54				

EXPERIMENTS WITH SUGAR BEETS.

Eight varieties of sugar beets were sown. The land was similar to that on which the mangels and turnips were sown, and it received the same treatment. Two sowings were made of each sort, the first on May 25 and the second on June 8. The seed was sown in rows 24 inches apart, in bunches 12 inches apart in the rows. When the plants were about 3 to 4 inches high the bunches were thinned out to one plant in each place. The whole crop was harvested October 13, and the yield calculated from the weight obtained from two rows each 66 feet long.

SUGAR BEETS—TEST OF VARIETIES.

Number.	Name of Variety.	Yield per Acre. 1st Plot.		Yield per Acre. 1st Plot.		Yield per Acre. 2nd Plot.		Yield per Acre. 2nd Plot.	
		Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
1	Red Top Sugar	28	1,912	965	12	19	912	648	32
2	Danish Red Top	28	1,000	950	0	15	1,464	520	24
3	Royal Giant	27	1,176	919	36	16	1,592	559	52
4	Improved Imperial	24	336	805	36	17	960	582	40
5	Danish Improved	23	824	780	24	19	304	638	24
6	Wanzleben	16	1,592	559	52	12	168	402	48
7	Vilmorin's Improved	16	1,440	557	20	12	1,232	420	32
8	French Very Rich	14	120	468	40	11	344	372	24

EXPERIMENTS WITH CARROTS.

Ten varieties of carrots were under test. Two sowings were made of each sort, the first on May 25 and the second on June 8, in rows 24 inches apart, and thinned to about 3 inches apart in the rows. The ground was similar to that used for the turnip and mangel plots, and received the same treatment. The crop was pulled October 17. The yield was calculated from the weight of roots taken from two rows each 66 feet long. The following table gives the yield per acre obtained:—

CARROTS—TEST OF VARIETIES.

Number.	Name of Variety.	Yield per Acre. 1st Plot.		Yield per Acre. 1st Plot.		Yield per Acre. 2nd Plot.		Yield per Acre. 2nd Plot.	
		Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
1	Improved Short White	19	304	638	24	12	1,683	428	8
2	New White Intermediate	19	0	633	20	12	320	405	20
3	Giant White Vosges	18	1,544	625	44	11	1,712	395	12
4	Mammoth White Intermediate	18	1,392	623	12	12	1,080	418	
5	Carter's Orange Giant	18	1,240	620	40	11	344	372	24
6	White Belgian	18	784	613	4	11	1,864	397	44
7	Ontario Champion	18	24	600	24	11	344	372	24
8	Long Yellow Stump-rooted	17	808	580	8	11	800	380	
9	Early Gem	17	504	575	4	10	1,736	362	16
10	Half Long Chantenay	17	200	570		11	40	367	20

EXPERIMENTS WITH POTATOES.

Forty-one varieties of potatoes were under test this year. The land was a clay loam on which potatoes had been grown last year (1904), for which crop 20 one-horse cart loads of barnyard manure had been spread on the previous autumn and ploughed under, together with a fairly good growth of clover. Last fall this land was left without ploughing after the potatoes were dug. This spring it was worked up well with spring-tooth and spade harrow; ploughed and again worked up well. Rows were run 30 inches apart and from 3 to 4 inches deep. Potato fertilizer at the rate of 400 lbs. per acre was spread in the rows before planting. The sets were planted one foot apart in the rows and covered with the drill plough. The tubers were cut so as to have from two to three eyes in each set. The drills were harrowed down before the plants came up, to kill the weeds, and again drilled up a few days later. The cultivator was run between the rows about once a week until the vines were quite large. The field was hoed once by hand. These plots were sprayed with Bordeaux mixture and Paris green three times.

There was no blight noticeable and no rot, but a considerable quantity of scab was observed, more than has been seen here for many years.

The potatoes were planted May 31, and dug October 3 and 4. Each plot was two rows 66 feet long and 30 inches wide. The following yields were obtained:—

POTATOES—TEST OF VARIETIES.

Number.	Name of Variety.	Quality.	Total Yield per Acre.		Yield per Acre of Marketable.		Yield per Acre of Unmarketable.		Form and Colour.
			Bush.	Lbs.	Bush.	Lbs.	Bush	Lbs.	
1	Vermont Gold Coin	Good	512	36	444	24	68	12	Round, flat, white.
2	Morgan Seedling	"	484	0	413	36	70	24	Oblong, pink and white.
3	Holborn Abundance	Medium	477	24	396	0	81	34	Round, white.
4	Vick's Extra Early	Good	424	36	374	0	50	36	Long, pink and white.
5	I. X. L	Medium	418	0	363	0	55	0	" "
6	Dooley	Good	413	36	380	36	33	0	Round "
7	Empire State	"	407	0	347	36	59	24	Long, round, white.
8	American Wonder	"	407	0	341	0	66	0	" "
9	Money Maker	"	387	12	330	0	57	12	" white.
10	Late Puritan	"	360	48	303	36	57	12	" pink and white.
11	Carman No. 1	"	354	12	297	0	57	12	Round, white.
12	Delaware	"	352	0	292	36	59	24	"
13	Early Elkinah	"	352	0	281	36	70	24	Oblong, pink.
14	Enormous	Medium	345	24	305	48	39	36	Round, white.
15	Rose No. 9	"	345	24	299	42	46	12	" dark pink.
16	Early White Prize	Good	345	24	272	48	72	36	Long, white.
17	Pearce	"	338	48	270	36	68	12	Oblong, pink and white.
18	Pingree	"	330	0	272	48	57	12	" white.
19	Swiss Snowflake	"	327	48	253	0	74	48	Round "
20	Country Gentleman	Medium	327	48	237	36	90	12	" pink and white.
21	Rochester Rose	"	325	36	268	24	57	12	Oblong, dark pink.
22	Penn Manor	"	325	36	253	0	72	36	Long, pink.
23	State of Maine	Good	321	12	272	48	48	24	Round, flat, white.
24	Canadian Beauty	"	319	0	264	0	55	0	Long, pink and white.
25	Carman No. 3	"	319	0	244	12	74	48	Round, white.
26	Irish Cobler	"	308	0	248	36	59	24	"
27	American Giant	"	301	24	235	24	66	0	Round, dark pink.
28	Maule's Thoroughbred	Medium	301	24	224	24	77	0	Oblong, pink.
29	Seedling No. 7	"	288	12	222	12	66	0	" dark pink.
30	Sabean's Elephant	"	275	0	209	0	66	0	" white.
31	Burnaby Mammoth	"	272	48	213	24	59	24	" pink and white.
32	Uncle Sam	Good	270	36	209	0	61	36	Round, white.
33	Everett	"	268	24	211	12	57	12	" flat, white.
34	Cambridge Russet	"	266	12	182	36	83	36	Oblong, white.
35	Dreer's Standard	"	264	0	182	36	81	24	Round "
36	Bovee	"	257	24	184	48	72	36	Oblong, pink and white.
37	Early Rose	"	244	12	178	12	66	0	Long, pink.
38	Early St. George	"	233	12	167	12	66	0	"
39	Early Envoy	"	233	12	138	36	94	36	Oblong, pink.
40	Reeve's Rose	"	222	12	162	48	59	24	"
41	Early Andes	"	217	48	151	48	66	0	Round, pink.

EXPERIMENTS IN INOCULATING CLOVER AND ALFALFA.

These experiments were carried on with seed treated and supplied from the Central Experimental Farm, Ottawa. Two half-acre plots were used for the Red clover and two for the Alfalfa, the seed for one plot in each case being treated with the culture of bacteria, the other untreated. The land was in a poor state of fertility and supposed to be deficient in clover bacteria, as practically no clover had been grown on this land for quite a few years. For this reason this piece was selected, the claim being made that the effect of the treatment would be more clearly manifest where these bacteria were most deficient. Careful notes were taken from time to time but there was no perceptible difference between the plots sown with treated and untreated seed. A careful examination of the roots was also made and with the same results, the clover in each case having many more nodules than were found on the alfalfa.

A similar experiment was carried on in plots of one-twentieth of an acre each, on a piece of land in a good state of fertility, that had grown a crop of beans the previous year, with similar results. At present there is a good stand of both clover and alfalfa on this piece of land and it is being left without any other cover for the winter.

EXPERIMENTS WITH ALFALFA.

(Repeated from report of 1904.)

A one-fortieth acre plot of alfalfa was sown early in June, 1902, with barley as a nurse crop. The nurse crop was cut early in August. The plants only made fair growth and during the following winter were killed out excepting a few plants. These made very poor growth during the season of 1903, and now only two weak plants remain.

In 1903 a similar plot was sown early in June, wheat being used as a nurse crop, which was left uncut and allowed to remain as a protection during the winter. The alfalfa plants made a good start and nearly all came through the winter, but made very poor growth this season. A few plants of Red clover that happened by chance to get into this plot lived through the winter and made exceptionally good growth. This plot was cut twice through the summer, at which times the alfalfa was only from 4 to 6 inches high, while the few plants of Red clover in this plot were at least three times that height. The soil of these two plots was a heavy clay, underdrained, in a fair state of fertility and was well cultivated before sowing.

This season a plot of one-tenth acre of alfalfa was sown. The soil was a heavy clay, underdrained, and in a good state of fertility. This land was ploughed May 13 and well worked up. It was again worked May 29, June 20 and 29 with the spring-tooth and smoothing harrows. On July 7 this ground was again worked with the spade, spring-tooth and smoothing harrows, and alfalfa sown at the rate of 25 lbs. per acre with the grain seed drill. One-half of the plot was sown with wheat at the rate of 2 bushels per acre as a nurse crop, and the other half with alfalfa alone. The alfalfa on the plot without a nurse crop made a much more satisfactory growth than that with the nurse crop, and was much better than that of any former year. On October 20 the growth of that sown alone averaged 10 to 12 inches, and that with the nurse crop averaged only 5 to 7 inches. The nurse crop, which made a growth of about 24 inches, was allowed to remain as a protection throughout the winter.

This spring (1905) what remained of the nurse crop was removed. No particular difference was observed in the amount killed out either on that protected by the nurse crop or that unprotected, both growing fairly well in the early part of the season, that sown without the nurse crop being always considerably the best. On June 29, one one-hundredth of an acre of the best part of that which had no nurse crop was cut and weighed green, weighing 125 lbs., this being at the rate of 6¼ tons per acre, the remainder being too light to admit of being cut. An equal measure of clover cut from an adjoining field that had been sown about the same time the previous summer, gave 236 lbs., as against 125 lbs. of alfalfa.

EXPERIMENT WITH BEANS.

Three varieties of beans were sown with a view to test their relative value as a fodder plant: Common Soja beans, early Soja beans and Velvet beans. The Velvet beans did not come up, and seemed to rot in the ground. The following was the yield of the others from plots of one-thirtieth of an acre:—

Variety.	Yield per acre.
Soja beans (green)	1,035 lbs.
Soja beans (white)	475 "
Velvet beans (did not come up).	

EXPERIMENTS WITH MILLET.

Six varieties of millet were grown in plots of one-fortieth acre each. The land was a heavy clay loam in a rather poor state of fertility, not having had any manure for some years. The ground was ploughed in the fall and well worked up in the spring, and sown June 17. The crop was cut September 22. The following is the yield per acre cut green:—

Variety.	Yield per acre. Tons.	 Lbs.
Italian	10	280
Algerian	6	1,200
Green California	4	1,680
Moha Hungarian	3	680
White Round French	3	200
Pearl or Cat Tail	1	600

CLOVER EXPERIMENTS.

Experiments were again conducted for the purpose of indicating the gain, if any, from clover grown with grain crops and ploughed under as a fertilizer. These experiments have been conducted on the same land for the same three years. No fertilizer except the clover has been used. The soil was a clay loam, in a fair state of fertility. Twelve plots of one-fortieth acre each were used in this experiment, four plots each of oats, wheat and barley. In two of each (six in all) Mammoth Red clover was sown with the grain at the rate of 10 lbs. per acre. On the other six plots, no clover was sown. The plots sown with clover were the same as had been sown with clover in the previous years. The ground was ploughed in the spring and sown May 27. The following yields were obtained:—

CLOVER EXPERIMENTS.

Name of Variety and how Seeded.	Yield per acre.	
Wellman's Fife Wheat.	Bus.	Lbs.
No. 1 Without clover	34	20
No. 2 With clover	40	
No. 3 Without clover	39	
No. 4 With clover	41	40
Pioneer Oats.		
No. 1 Without clover	41	6
No. 2 With clover	55	10
No. 3 Without clover	60	
No. 4 With clover	60	29
Odessa Barley.		
No. 1 Without clover	32	34
No. 2 With clover	37	44
No. 3 Without clover	38	26
No. 4 With clover	42	44

SPECIAL EXPERIMENTS WITH FERTILIZERS.

Experiments with fertilizers of different kinds were continued for five years previous to 1904, it was then decided that further fertilizing of these plots should be discontinued for a time, and the land seeded to grain to determine to what extent the fertilizers already applied would continue to supply plant food for the crop. The field was seeded entirely to grain of different sorts. Two plots of each kind was sown. In one Mammoth Red clover was sown with grain, at the rate of 10 lbs. per acre, and in the other the grain was sown alone, not seeded. This is the second year that this has been done. The plots were one-eighth of an acre each. This ground was ploughed in the fall of 1904, the growth of clover was light owing to the particularly dry summer. The following yields were obtained from these plots:—

Fertilizers used each year per acre, previous to 1904.	Waverley Oats, with Clover.		Waverley Oats, without Clover.		Colorado Wheat, with Clover.		Colorado Wheat, without Clover.		Newton Barley, with Clover.		Newton Barley, without Clover.		Mixed Grain, with Clover.		Mixed Grain, without Clover.		Golden Vine Pease, with Clover.		Golden Vine Pease, without Clover.	
	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush-	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.
1. Manure, 30 tons	76	16	72	2	41	40	46	40	54	8	59	18	51	10	53	30	37	30	41	40
2. Manure, 15 tons, fertilizer, 250 lbs	79	14	82	12	43	20	45	..	56	12	60	20	65	..	60	..	36	40	39	10
3. Complete fertilizer, 1,000 lbs	58	28	55	30	33	20	39	10	47	44	36	22	58	30	50	..	40	..	40	50
4. " 500 lbs	61	26	67	22	36	40	31	40	45	40	43	36	57	20	56	10	33	20	25	50
5. Check. No fertilizer used	61	26	63	8	26	40	23	20	50	..	39	28	55	..	50	..	26	40	23	20
6. Bone meal, 1,000 lbs	67	22	63	8	37	30	36	40	38	26	37	24	60	..	62	20	31	40	30	..
7. " 500 lbs	58	28	70	20	36	40	30	..	39	28	33	16	52	20	55	..	30	50	31	40
8. Ashes, 2,500 lbs	62	17	73	18	39	10	40	..	52	4	56	12	58	30	60	..	35	..	30	50
9. Manure, rotted, 20 tons	75	..	79	14	40	50	35	..	48	46	46	42	61	10	65	..	30	..	25	..
10. Check. No fertilizer used	38	8	38	8	15	..	15	50	33	16	28	6	32	20	37	20	11	40	10	50
11. Land plaster, 500 lbs	41	6	44	4	15	50	17	30	25	..	29	8	35	..	40	..	21	40	18	20
12. Salt, 500 lbs	55	30	50	..	27	30	26	40	34	18	39	28	50	..	52	20	22	30	20	..
13. Marsh mud, 100 tons	67	22	64	24	30	..	28	20	51	2	41	32	56	..	55	..	23	20	21	40
14. Manure, green, 20 tons	80	30	75	..	41	40	41	..	57	14	54	8	62	20	60	..	27	30	28	20

HAY CROP.

The crop of clover and timothy on the upland was particularly good this season. Twenty-three acres yielded 57 tons, 1,340 lbs.

The hay on the marsh, owing to the breaking of dykes in this locality for the past two autumns, and the repeated overflowing of the land with salt water, was a particularly poor crop, and is likely to be so each year until the land can be reseeded with clover and timothy. Forty-nine acres yielded 64 tons, 50 lbs.

The total hay crop was 121 tons, 1,390 lbs.

SUMMARY of crops grown exclusive of uniform test plots of grain and potatoes.

Hay.

	Tons.	Lbs.
Marsh hay	64	50
Upland hay	57	1,340
	121	1,390

Grain.

	Bush.	Lbs.	Lbs.
Mixed grain	1,007	30	40,310
Oats	364	20	12,396
Barley	102	15	4,911
Wheat	20	43	1,243
			58,860

Roots.

	Tons.	Lbs.
Turnips (field crop)	204	674
Turnips (test plots	8	1,540
	213	214
Mangels (field crop)	54	15
Mangels (test plots)	5	660
	59	675

Corn.

	Tons.	Lbs.
Corn (field crop)	60	507
Corn (test plots)	8	160
	68	667

SUMMARY OF FEED USED.

SUMMARY of feeds used in connection with stock on farms, July 1, 1904, to June 30, 1905.

—	Hay.	Grain or Meal.	Corn and Roots.
	Lbs.	Lbs.	Lbs.
Grown on farm	186,095	27,893	579,377
Purchased	144,365	142,000	
On hand July 1, 1904		7,000	
Total	330,460	176,893	579,377

The meal consumed consisted of oats, 40,172 lbs.; mixed grain (oats, pease and barley), 17,327 lbs.; gluten meal, 30,000 lbs.; oil cake, 4,000 lbs.; cornmeal, 6,000 lbs.; bran, 30,000 lbs.; middlings, 38,000 lbs.; buckwheat, 3,072 lbs.; barley, 1,322 lbs.; on hand July 1, 1904, 7,000 lbs.; total, 176,893.

DISPOSITION OF FEEDS.

Disposition of feed harvested and purchased for use of live stock on farm, July 1, 1904, to June 30, 1905:—

Class Fed.	Grain or Meal.	Corn or Roots.	Hay.	Grain or Meal.	Corn or Roots.	Hay.
	Lbs.	Lbs.	Lbs.			
8 horses	40,880	....	58,400	Weighed ...	Weighed .	Weighed.
24 steers	26,160	202,400	63,360	" ...	" ..	"
10 young steers	3,550	54,100	11,290	" ...	" ..	"
21 cows (summer, 5 months)	7,875	9,029	15,750	Estimated ..	" ..	"
22 cows (winter, 7 months)	41,580	184,800	55,440	Weighed ...	" ..	"
23 dry cows, bulls and young stock	15,750	66,590	89,250	Estimated ..	" ..	"
Poultry	2,000	....	....	" ..		
20 sheep	3,600	2,400	7,200	Weighed ...	" ..	"
40 swine	21,000	1,000	....	....	" ..	"
Seed	7,000	....	....	....		
Total account	169,395	520,319	300,690			
Amount harvested	176,893	579,377	330,460			
Shrinkage	7,498	59,058	29,770			

GRAIN AND POTATO DISTRIBUTION.

Some of the most promising varieties of grain and potatoes were again distributed for test to farmers who made application. The following number of 3 lb. bags were sent out:—

Oats	167
Barley	89
Wheat	69
Pease	41
Buckwheat	23
Potatoes	280
Total	669

HORSES.

There are at present on the farm eight horses, consisting of six heavy team horses, one express horse and one driver. There have been no changes during the year. One horse is now 23 years old, and although in good condition, will likely have to be replaced shortly. The health and condition of the horses has been good throughout the year.

CATTLE.

The stock of cattle on the farm at present consists of 71 head, as follows:—

Guernseys	5
Ayrshires	14
Holsteins	7
Grade females	27
Steers, 1 year	10
Steer calves	8

EXPERIMENTS WITH DAIRY COWS.

This experiment was carried on as in former years, to further determine the profit or loss of a fairly good dairy herd, well fed and cared for, with the feeds consumed charged at current market prices, and receiving credit for milk produced, the value of which being established by the price received at the creamery during the season.

The different feeds were charged at the following prices:—Hay, $8 per ton (average price for last few years); roots, $2 per ton; ensilage, $2 per ton; wheat bran, $19.50 per ton; gluten meal, $27 per ton; oil cake, $34 per ton; mixed grain (oats, pease and barley), $24 per ton; making an average price of mixed meal ration, as per proportion fed to cows, of 1⅛c. per lb. The ration fed to cows in full milk was: ensilage or roots, 50 lbs.; meal, 9 lbs.; hay, 12 lbs.; making a cost of 20⅝c. per cow per day.

In summer months, while milking they were charged $2.50 per month for summer feed as hereinafter explained, and when dry $1 per month.

Different quantities were fed to different cows, according to their capacity to consume or produce, or period of lactation, and charged accordingly.

When dry in winter they were charged $1 per month. From early fall until June they were kept in the stable, except on occasional fine days, when they were allowed out in the yard.

From June 1 to October, they were put out in the field the greater part of the time, night and day, but kept in during cold or wet weather.

They were fed, watered and milked each day, at as nearly regular intervals as possible.

The summer feed was practically all summer soiling crop, rye, clover or oats, pease and vetches grown together and sown at different times. After July 15 they were fed some hay, and after August 15 some green corn.

The milk of each cow was weighed at milking twice each day, and a careful record kept of the number of pounds given. The percentage of fat in the milk of each cow was determined by the Babcock milk tester, at the average of various tests taken throughout the year, and the fat, credited to the cow, on the basis that 85 pounds of fat produces 100 pounds of marketable butter.

The milk was sent to the Nappan dairy station until April 30, and the cows were credited with the butter produced at the prices paid to all patrons of that station, which averaged for the winter months 19 cents per lb. after deducting 4 cents per lb. for manufacturing and hauling milk. After this date the milk was separated at the stable, and the cream sent for a short time to the Maritime Dairy Co., Sussex, N.B., and the price credited, 22½ cents per lb., being the average price received by this creamery for the summer months, after deducting 1½ cents per lb., being the price charged for manufacturing.

The skim milk was credited to the cows at the rate of 15 cents per hundred pounds.

Twenty-two cows were in milk during the past season.

The following will show the results obtained:—

Number.	Name.	Age.	Breed.	Date of dropping last calf.	Days in Milk.	Lbs. Milk.	Fat.	Butter.	Value Sk. Milk.	Total Credit.	Cost of Feed.	Profit.
							p. c.	Lbs.	$ cts.	$ cts.	$ cts.	$ cts.
1	Corie	8 yrs.	Ay. Grade	Apl. 3,'05	300	7,200	4·0	338·82	7·20	79 47	49 40	30 07
2	Curly	6 "	Ay. G. Grade	Feb. 15,'05	285	6,400	4·1	308·70	6·40	72 25	47 54	21 71
3	Rae	4½ "	"	Jan. 15,'05	285	6,100	4·4	315·76	6·10	71 62	47 81	23 81
4	Lida Rooker	5 "	Holstein	Mar. 25,'05	290	6,990	3·6	296·04	6·99	70 14	46 50	23 64
5	Ilda Rooker	6 "	"	" 1,'05	300	6,800	3·6	288·00	6·80	69 08	47 54	21 54
6	Lizzie	4½ "	Ay. G. Grade	Feb. 10,'05	260	5,300	4·3	268·11	5·30	60 93	43 37	17 56
7	Eva Rooker	10 "	Holstein	Jan. 1,'05	300	7,300	3·3	283·41	7·30	66 30	49 10	17 20
8	Rex's Maud	10 "	Guernsey	Dec. 30,'04	240	5,300	4·7	293·05	5·30	62 68	47 72	14 96
9	Sylva	2½ "	Ay. Grade	Mar. 1,'05	270	4,500	4·6	243·52	4·50	56 49	41 98	14 51
10	Stella	2½ "	"	Feb. 14,'05	285	4,800	4·4	248·47	4·80	57 80	43 37	14 43
11	Jesse	2½ "	"	Jan. 1,'05	270	5,500	4·1	265·29	5·50	59 00	44 60	14 40
12	Mossy	6 "	Jer. Grade	Feb. 1,'05	270	5,100	4·2	252·00	5·10	58 86	44 78	14 08
13	Maggie	4½ "	Ay. Grade	Jan. 15,'05	270	5,900	3·8	263·76	5·90	60 63	47 81	12 82
14	Minnie	2½ "	Ayrshire	Feb. 1,'05	300	5,040	4·1	243·10	5·04	56 90	44 78	12 12
15	Sarah	4½ "	"	" 1,'05	300	5,380	4·0	253·17	5·38	57 91	46 22	11 69
16	Flora	5 "	"	Sep. 30,'04	300	5,500	4·1	265·29	5·50	58 99	48 74	10 25
17	Nora	3½ "	"	Feb. 1,'04	270	5,210	4·0	245·17	5·21	56 08	46 22	9 86
18	Winnie	4½ "	Ay. G. Grade	Jan. 15,'04	285	5,540	3·8	247·67	5·54	56 93	47 81	9 12
19	Helen	2½ "	Ay. Grade	Feb. 10,'04	290	5,500	3·4	220·00	5·50	52 44	43 37	9 07
20	Polly	2½ "	"	" 1,'04	270	4,920	3·9	225·74	4·92	51 76	44 78	6 98
21	Beatrice	6 "	Ayrshire	Sep. 21,'04	210	5,100	3·6	216·00	5·10	46 14	43 50	2 64
22	Mamie	2½ "	"	Aug. 1,'05	120	3,250	3·4	130·00	3·25	32 50	32 00	0 50

EXPERIMENTS WITH STEERS.

EXPERIMENT I.—*Fed in Stalls vs. Fed in Loose Box.*

Sixteen steers were used for this test, in two lots of eight each, termed lot I. and lot II., containing four 2½ year old, and four 3½ year old steers in each lot. Lot I. were placed in loose boxes, and lot II. were tied up, and were, as nearly as possible, equal in form, features and weight (shorthorn grades).

The weights given are the weights taken after a fast of fourteen hours, that is, from 7 p.m. to 9 a.m the following morning. Both lots were fed alike from start to finish of this test.

They were kept in the stable all the time, except on occasional fine days, when they were let out for a time, averaging not more than once a week.

The feeds were charged at the following prices:—Hay, $8 per ton (average price for last 5 years); roots, $2 per ton; ensilage, $2 per ton; wheat bran, $19.50 per ton; gluten meal, $27 per ton; oil cake, $34 per ton; mixed grain (oats, pease and barley), $24 per ton; making an average cost of meal ration of 1⅕ cents per lb. as per proportion fed.

The steers were all dehorned immediately after beginning of the test, with a keystone clipper. No bad effects were noticed.

As a result of the decrease in weight from this operation, a very slight increase was obtained up to December 1, showing that an average of two weeks was required to regain this loss.

The result of this experiment again shows slightly more gain for those fed in loose box-stalls, than for those tied up.

Following are the results obtained:—

RECORD OF STEERS FED FROM NOV. 16, 1904, TO APRIL 30, 1905.

STEER EXPERIMENT I.

LOT I.—DEHORNED, FED IN LOOSE BOX.

Weight at Start, Nov. 16.	Gain, Dec. 1.	Gain, Dec. 31.	Gain, June 30,	Gain, Nov. 1.	Gain, Mar. 31.	Gain, April 30.	Weight at Finish, April 30.	Total Gains.
Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
8,815	50	700	525	415	280	120	10,905	2,090

LOT II.—DEHORNED, TIED IN STALLS.

8,940	45	675	490	465	200	135	10,950	2,010

RATIONS AND COST PER DAY FOR ONE STEER FOR ENTIRE PERIOD.

Period.	Daily Ration.	Daily Cost.	Cost for Period.	Total.
		$ cts.	$ cts.	$ cts.
Nov. 16 to Dec. 1	Roots, 90 lbs	0 09	1 35	
	Hay, 10 lbs	0 04	0 60	
	Meal, 2 lbs	0 02⅖	0 42	2 37
Dec. 1 to Dec. 31	Roots, 60 lbs	0 06	1 80	
	Hay, 10 lbs	0 04	1 20	
	Meal, 3 lbs	0 03⅗	1 08	4 08
Dec. 31 to Jan. 30	Roots, 40 lbs	0 04	1 20	
	Hay, 10 lbs.	0 04	1 20	
	Meal, 4 lbs	0 04⅘	1 44	3 84
Jan. 30 to Mar. 1	Roots, 30 lbs	0 03	0 90	
	Hay, 12 lbs	0 04⅘	1 44	
	Meal, 5 lbs	0 06	1 80	4 14
Mar. 1 to Mar 31	Roots, 20 lbs	0 02	0 60	
	Hay, 15 lbs	0 06	1 80	
	Meal, 6 lbs	0 07⅕	2 16	4 56
Mar. 31 to April 30	Roots, 20 lbs	0 02	0 60	
	Hay, 15 lbs	0 06	1 80	
	Meal, 7 lbs	0 08⅖	2 52	4 92
Cost of feed one steer, 165 days				23 81

SUMMARY OF EXPERIMENT WITH STEERS.

FINANCIAL PART.

Original weight of 16 steers, 17,755 lbs. at 4c. per lb.	$ 710 20
Weight at finish, 16 steers, 21,855 lbs. at $5\frac{36}{100}$ per lb.	1,171 42
Balance	$ 461 22
Cost of feed for lot, 165 days	382 56
Net profit	$ 78 66
Daily rate of gain per steer	lbs. 1·55
Cost of 1 lb. gain	cts. 9·33
Cost of feed per day per steer	cts. 14·49

Profit per steer, $4.91.

EXPERIMENTS WITH STEERS.

EX. II.—INFLUENCE OF AGE ON COST OF BEEF.

This experiment was carried on with a view to gain some data as to the influence of age upon the cost of production of beef.

Three lots of animals, of as nearly uniform type and breeding as possible, were selected for this test, consisting of eight 3-year olds, termed lot I; eight 2-year olds, termed lot II.; and eight yearlings, termed lot III.

The prices charged for feed consumed were the same as in 'Experiments with steers, Ex. I.'

They were all dehorned two weeks previous to beginning of test, and had evidently quite recovered from the effects of the operation at beginning of test, December 1.

The following tables will show the amounts fed and results obtained:—

Ex. II.—Lot I.—Three Year Old Steers.

Period.	Daily Ration.	Daily Cost.	Cost for Period.	Total Cost.
		$ cts.	$ cts.	$ cts.
Dec. 1 to Dec. 31	Roots, 60 lbs	0 06	1 80	
	Hay, 10 lbs.	0 04	1 20	
	Meal, 3 lbs	0 03⅗	1 08	4 08
Dec. 31 to Jan. 30	Roots, 40 lbs	0 04	1 20	
	Hay, 10 lbs.	0 04	1 20	
	Meal, 4 lbs	0 04⅘	1 44	3 84
Jan. 30 to Mar. 1	Roots, 30 lbs	0 03	0 90	
	Hay, 12 lbs.	0 04⅘	1 44	
	Meal, 5 lbs	0 06	1 80	4 14
Mar. 1 to Mar. 31	Roots, 20 lbs	0 02	0 60	
	Hay, 15 lbs.	0 06	1 80	
	Meal, 6 lbs.	0 07⅕	2 16	4 56
Mar. 31 to April 30	Roots, 20 lbs	0 02	0 60	
	Hay, 15 lbs.	0 06	1 80	
	Meal, 7 lbs.	0 08⅖	2 52	4 92
Cost of feed 1 steer 150 days				21 54
" 8 steers 150 days				172 32

	Lbs.
Weight of 8 steers, Dec. 1, 1904	9,110
Weight of 8 steers, April 30, 1905	11,075
Gain	1,960
Daily rate of gain . . . lbs.	1·6375
Cost of feed per day . . . cts.	14·36
Cost of 1 lb. gain . . . cts.	8·76

Ex. II.—Lot II.—Two Year Old Steers.

Period.	Daily Ration.	Daily Cost.	Cost for Period.	Total Cost.
		$ cts.	$ cts.	$ cts.
Dec. 1 to Dec. 31	Roots, 60 lbs.	0 06	1 80	
	Hay, 10 lbs.	0 04	1 20	
	Meal, 3 lbs	0 3⅗	1 08	4 08
Dec. 31 to Jan. 30	Roots, 40 lbs	0 04	1 20	
	Hay, 10 lbs	0 04	1 20	
	Meal, 4 lbs.	0 04⅘	1 44	3 84
Jan. 30 to Mar. 1	Roots, 30 lbs	0 03	0 90	
	Hay, 12 lbs.	0 04⅘	1 44	
	Meal, 5 lbs.	0 06	1 80	4 14
Mar. 1 to Mar. 31	Roots, 20 lbs	0 02	0 60	
	Hay, 15 lbs.	0 06	1 80	
	Meal, 6 lbs.	0 07⅕	2 16	4 56
Mar. 31 to April 30	Roots, 20 lbs	0 02	0 60	
	Hay, 15 lbs.	0 06	1 80	
	Meal, 7 lbs.	0 08⅖	2 52	4 92
Cost of feed 1 steer 150 days				21 54
″ 8 steers 150 days				172 32

	Lbs.
Weight of 8 steers, Dec. 1, 1904	8,740
Weight of 8 steers, April 30, 1905	10,780
Gain	2,040
Daily rate of gain per steer . . . lbs.	1·70
Cost of feeding per day per steer . . . cts.	14·36
Cost of 1 lb. gain . . . "	8·44

Ex. II.—Lot III.—Year Old Steers.

Period.	Daily Ration.	Daily Cost.	Cost for period.	Total Cost.
		$ cts.	$ cts.	$ cts.
Dec. 1 to Dec. 31	Roots, 60 lbs	0 06	1 80	3 84
	Hay, 8 lbs	0 03⅕	0 96	
	Meal, 3 lbs.	0 03⅗	1 08	
Dec. 31 to Jan. 30	Roots, 40 lbs	0 04	1 20	3 60
	Hay, 8 lbs	0 03⅕	0 96	
	Meal, 4 lbs.	0 04⅘	1 44	
Jan. 30 to March 1	Roots, 30 lbs	0 03	0 90	3 54
	Hay, 10 lbs	0 04	1 20	
	Meal, 4 lbs.	0 04⅘	1 44	
March 1 to March 31	Roots, 20 lbs	0 02	0 60	3 60
	Hay, 10 lbs	0 04	1 20	
	Meal, 5 lbs.	0 06	1 80	
March 31 to April 30	Roots, 20 lbs	0 02	0 60	3 96
	Hay, 10 lbs.	0 04	1 20	
	Meal, 6 lbs.	0 07⅕	2 16	
Cost of feed 1 steer 150 days				18 54
" 8 steers "				148 32

	Lbs.
Weight of 8 steers, Dec. 1, 1904	7,640
Weight of 8 steers, April 30, 1905	9,740
Gain	2,100
Daily rate of gain per steer . . lbs.	1·75
Cost of feed per day per steer . . cts.	12·36
Cost of 1 lb. gain . . "	7·06

COMPARISON OF EXPERIMENTS WITH STEERS.

EXPERIMENT II.

——	Lot 1, 3-yr. old.	Lot 2, 2-yr. old.	Lot 3, year-old.
Daily rate of grain per steer	1 6375 lbs.	1·70 lbs.	1·75 lbs.
Cost of feed per day "	14·36 cts.	14·36 cts.	12·36 cts.
Cost of 1 lb. gain	8·76 "	8·44 "	7·06 "

STEER CALF EXPERIMENT.

This experiment which was started in May, 1901, with ten calves, in two lots of five each, to determine the comparative economy of feeding calves a 'full fattening ration' as contrasted with a 'limited growing ration,' was continued from November 30, 1904, with animals termed lot II., Ex. II., and lot I., Ex. III., finished and sold April 30 and May 31, 1905. Ex. IV., lots I. and II. were also continued.

The following tables show the results:—

Ex. II.—Lot II.—Calves of May, 1902, Continued from December 1, 1904.

Period.	Daily Ration.	Daily Cost.	Cost for Period.	Total Cost.
		$ cts.	$ cts.	$ cts.
Dec. 1 to Dec. 31	Roots, 90 lbs	0 09	2 70	4 98
	Hay, 10 lbs	0 04	1 20	
	Meal, 3 lbs	0 03⅗	1 08	
Dec. 31 to Jan. 30	Roots, 60 lbs	0 06	1 80	4 44
	Hay, 10 lbs	0 04	1 20	
	Meal, 4 lbs	0 04⅘	1 44	
Jan. 30 to March 1	Roots, 60 lbs	0 06	1 80	5 40
	Hay, 12 lbs	0 04⅘	1 44	
	Meal, 6 lbs	0 07⅕	2 16	
March 1 to March 31	Roots, 40 lbs	0 04	1 20	4 80
	Hay, 12 lbs	0 04⅘	1 44	
	Meal, 6 lbs	0 07⅕	2 16	
March 31 to April 30	Roots, 30 lbs	0 03	0 90	5 58
	Hay, 15 lbs	0 06	1 80	
	Meal, 8 lbs	0 09⅗	2 88	
April 30 to May 30	Roots, 20 lbs	0 02	0 60	6 00
	Hay, 15 lbs	0 06	1 80	
	Meal, 10 lbs	0 12	3 60	
Cost of feed, one steer, 180 days				31 20

Lot 2.	Weight at start.	Weight at finish.	Gain.
	Lbs.	Lbs.	Lbs.
Dec. 1 to May 30	5,475	6,800	1,325

Daily rate of gain per steer	lbs.	1·47
Cost of feed per day per steer	cts.	17·73
Cost of 1 lb. gain	"	11·77
Cost of feed for lot, 180 days		$156 00

Ex. III.—Lot I.—Continued from December 1, 1904.

Period.	Daily Ration.	Daily Cost.	Cost for Period.	Total Cost.
		$ cts.	$ cts.	$ cts.
Dec. 1 to Dec. 31	Roots, 60 lbs	0 06	1 80	
	Hay, 8 lbs	0 03⅕	0 96	
	Meal, 3 lbs	0 03⅗	1 08	3 84
Dec. 31 to Jan. 30	Roots, 40 lbs	0 04	1 20	
	Hay, 8 lbs	0 03⅕	0 96	
	Meal, 4 lbs	0 04⅘	1 44	3 60
Jan. 30 to March 1	Roots, 30 lbs	0 03	0 90	
	Hay, 10 lbs	0 04	1 20	
	Meal, 4 lbs	0 04⅘	1 44	3 54
March 1 to March 31	Roots, 20 lbs	0 02	0 60	
	Hay, 10 lbs	0 04	1 20	
	Meal, 5 lbs	0 06	1 80	3 60
March 31 to April 30	Roots, 20 lbs	0 02	0 60	
	Hay, 10 lbs	0 04	1 20	
	Meal, 6 lbs	0 07⅕	2 16	3 96
Cost of feed, one steer, 150 days				18 54

Lot 1.	Weight at start.	Weight at finish.	Gain.
	Lbs.	Lbs.	Lbs.
Dec. 1 to April 30	4,820	6,535	1,715

Daily rate of gain per steer	lbs.	2·28
Cost of feed per day per steer	cts.	12·36
Cost of 1 lb. gain	"	5·40
Cost of feed for lot, 150 days		$92 70

Ex. IV.—Lot I.—Calves of May, 1904, Continued from December, 1904.

Period.	Daily Ration.	Daily Cost.	Cost for Period.	Total Cost.
		$ cts.	$ cts.	$ cts.
Dec. 1 to Dec. 31	Roots, 15 lbs	0 01½	0 45	
	Hay, 2½ lbs	0 01	0 30	
	Meal, 2 lbs	0 02⅖	0 72	1 47
Dec. 31 to Jan. 30	Roots, 20 lbs	0 02	0 60	
	Hay, 2½ lbs	0 01	0 30	
	Meal, 2 lbs	0 02⅖	0 72	1 62
Jan. 30 to March 1	Roots, 25 lbs	0 02½	0 75	
	Hay, 4 lbs	0 01⅗	0 48	
	Meal, 2 lbs	0 02⅖	0 72	1 95
March 1 to March 31	Roots, 30 lbs	0 03	0 90	
	Hay, 4 lbs	0 01⅗	0 48	
	Meal, 2 lbs.	0 02⅖	0 72	2 10
March 31 to April 30	Roots, 30 lbs	0 03	0 90	
	Hay, 4 lbs	0 01⅗	0 48	
	Meal, 2 lbs.	0 02⅖	0 72	2 10
April 30 to May 30	Roots, 30 lbs	0 03	0 90	
	Hay, 4 lbs	0 01⅗	0 48	
	Meal, 2 lbs	0 02⅖	0 72	2 10
May 30 to Sept. 1	Meal, 1 lb	0 01⅕	1 11⅗	
	Pasture at		$1 per month	4 11⅗
Sept. 1 to Oct. 1	Green feed, 40 lbs	0 04	1 20	
	Meal, 2 lbs	0 02⅖	0 72	1 92
Oct. 1 to Nov. 1	Green feed, 40 lbs	0 04	1 24	
	Meal, 2 lbs.	0 02⅖	0 74⅖	1 94⅖
Nov. 1 to Dec. 1	Roots, 40 lbs	0 04	1 20	
	Hay, 5 lbs	0 02	0 60	
	Meal, 2 lbs.	0 02⅖	0 72	2 52
Cost of feed, one steer, 1 year				21 84

Lot. 1.	Weight at start.	Weight at finish.	Gain.
Period.	Lbs.	Lbs.	Lbs.
Dec. 1 1904 to Dec. 1 1905	2,650	4,815	2,165

Daily rate of gain per steer	lbs.	1·18
Cost of feed per day per steer (winter)	cts.	6·60
" " " (summer)	"	5·32
" " " 1 year	"	5·98
Cost of 1 lb. gain	"	5·04
Cost of feed for lot, 1 year		$109 20

Ex. IV.—Lot II.—Calves of May, 1904, Continued from December, 1904.

Lot. II.	Daily Rations.	Daily Cost.	Cost for Period.	Total Cost.
Period.		$ cts.	$ cts.	$ cts.
Dec. 1 to Dec 31	Roots, 20 lbs Hay, 2 lbs Meal, ½ lb	0 02 0 00⅘ 0 00⅗	0 60 0 24 0 18	1 02
Dec. 31 to Jan. 30	Roots, 25 lbs Hay, 2 lbs Meal, ½ lb	0 02½ 0 00⅘ 0 00⅗	0 75 0 24 0 18	1 17
Jan. 30 to Mar. 1	Roots, 25 lbs Hay, 2½ lbs Meal, ½ lb	0 02½ 0 01 0 00⅗	0 75 0 30 0 18	1 23
Mar. 1 to Mar. 31	Roots, 30 lbs Hay, 2½ lbs Meal, ½ lb	0 03 0 01 0 00⅗	0 90 0 30 0 18	1 38
Mar. 31 to Apl. 30	Roots, 30 lbs Hay, 4 lbs Meal, ½ lb	0 03 0 01⅗ 0 00⅗	0 90 0 48 0 18	1 56
Apl. 30 to May 30	Roots, 30 lbs Hay, 4 lbs	0 03 0 01⅗	0 90 0 48	1 38
May 30 to Oct. 1	Pasture at		4 00	4 00
Oct. 1 to Oct. 30	Roots, 30 lbs Hay, 4 lbs Meal, 1 lb	0 03 0 01⅗ 0 01⅕	0 90 0 48 0 36	1 74
Oct 31 to Nov. 30	Roots, 40 lbs Hay, 4 lbs Meal, 1 lb	0 04 0 01⅗ 0 01⅕	1 20 0 48 0 36	2 04
Cost of feed, 1 steer, 1 year				15 52

	Weight at start.	Weight at finish.	Gain.
Dec. 1, 1904, to Dec. 1, 1905	2,015 lbs.	3,480 lbs.	1,465 lbs.

Daily rate of gain per steer	lbs.	·80
Cost of feed per day per steer (winter)	cts.	4·60
“ “ (summer)	cts.	3·82
“ “ 1 year	cts.	4·25
Cost of 1 lb. gain	cts.	5·29
Cost of feed for lot, 1 year	$77 60	

COMPARISON OF STEER-CALF EXPERIMENTS.

Full feeding ration vs. light feeding ration, from birth to block.

Since May, 1901, experiments have been carried on each year to determine the comparative economy of feeding calves a ‘full fattening ration’ from the start, as contrasted with a ‘limited growing ration.’

Each of the lots of ‘full fattening ration’ were sold when two years old, the lots on ‘limited growing ration’ in each case were continued until 3 years old before being sold.

Following is a summary of results obtained:—

—	Full Fattening Ration.				Limited Growing Ration.		
	1901.	1902.	1903.	Average of 15 Steers.	1901.	1902.	Average of 10 Steers.
	Ex. I. Lot I. — 5 Steers.	Ex. II. Lot I. — 5 Steers.	Ex. III. Lot I. — 5 Steers.		Ex. I. Lot II. — 5 Steers.	Ex. II. Lot II. — 5 Steers.	
	Per Steer.	Per Steer.	Per Steer.		Per Steer.	Per Steer.	
Number of days fed	713·	683·	515·	637·	1108·	1108·	1108·
Weight when put on experiment	166·	191·	579·	312·	153·	121·	137·
Weight when slaughtered...	1271·	1246·	1307·	1272·	1306·	1360·	1333·
Daily rate of gain.	1·54·	1·54·	1·41·	1·49·	1·04·	1·11·	1·075
Amount meal eaten........	1804·	1633·	1328·	1588·	1549·	1419·	1484·
″ hay ″	2590·	2164·	2310·	2355·	3470·	4489·	3979·
″ roots ″	14725·	13360·	13500·	13861·	24695·	23762·	24228·
″ straw ″	....	....	....	....	597·	600·	598·
″ skim-milk eaten....	1712·	1742·	....	1727·	2080.	2320·	2200·
″ whole milk eaten...	728·	698·	....	713.	360·	120·	240·
″ pasture ″ ...	3 months.	....	2½ months.	11 weeks.	10 months.	10 months.	10 months.
″ green feed ″ ...	1240·	4300·	3080·	2873·	....	....	....
Cost of feed from birth to block....................	$65 47	$58 35	$43 00	$55 60	$72 00	$73 91	$72 95
Cost of 100 lbs. increase live weight	$ 5 92	$ 5 53	$ 5 90	$ 5 78	$ 6 24	$ 5 96	$ 6 10

SWINE.

The herd of pigs at present on the farm consists of Yorkshires, Berkshires and their grades and crosses, in all 49 head, as follows:—1 Yorkshire boar, 3 Yorkshire sows, 2 Berkshire sows, 3 grade sows, 10 grade pigs 6 months old, 30 grade pigs 1 to 3 months old.

EXPERIMENTS WITH SWINE.

Pasture vs. feeding in pens.

This experiment was again carried on as in past years, with two lots of 10 pigs each, as evenly divided as to age and weight as possible, being equal numbers from each litter and from 1 to 2 months old.

This experiment was commenced on July 1, with lot I. on pasture and lot II. fed inside.

They were fed equal amounts of milk and meal, consisting of shorts and buckwheat.

The pasture consisted of clover, rape and hairy vetch on different parts of the field, and the pigs were changed from time to time.

A portable house was used for shelter.

From October 1 to November 15 all were fed alike in pens.

Following are the results:—

Lot 1.—Fed on pasture July 1 to October 1. Fed in pens October 1 to November 15.

Period.	Lot I.		
	Weight at Start.	Weight at Finish.	Gain.
	Lbs.	Lbs.	Lbs.
July 1 to October 1	235	925	690
October 1 to November 15	925	1,510	585

Average daily gain on pasture, July 1 to October 1. . . . . .lbs. ·74
" in pens, October 1 to November 15. . . .lbs. 1·30
" 137 days. . . . . .lbs. ·93

Lot II.—Fed in pens, July 1, to November 15, 1905.

Period.	Lot II.		
	Weight at Start.	Weight at Finish	Gain.
	Lbs.	Lbs.	Lbs.
July 1 to October 1	245	1,073	828
October 1 to November 15	1,073	1,500	427

Average daily gain in pens, July 1 to October 1 . . . . .lbs. ·90
" " October 1 to November 15 . . . .lbs. ·948
" " 137 days . . . . .lbs. ·916

SHEEP.

The flock of sheep at present on the farm consists of 7 Leicesters, 11 Shropshires and 4 grades, as follows:—

1 pure bred Leicester ram.
6 pure bred Leicester ewes.
7 pure bred Shropshire ewes.
4 pure bred Shropshire ewe lambs.
3 grade ewes.
1 grade ewe lamb.

POULTRY.

The stock of poultry on hand at present consists of B. P. Rocks, White Wyandottes, White Leghorns, Black Minorcas and Buff Orpingtons.

During the month of November a number of old and undesirable birds were disposed of, and a number of cockerels of the different breeds sold to farmers for breeding purposes, leaving the stock on hand as follows:—

Breed.	Hens.	Cocks.	Pullets.	Cockerels.
B. P. Rocks	4	1	16	2
W. Wyandottes	..	..	8	1
W. Leghorns	2	..	3	1
Black Minorcas	5	..	2	1
Buff Orpingtons	..	..	8	..

All have kept quite healthy, and 75 chicks were raised during the season.

Very few eggs were laid previous to March 1, owing to the fact that the hens were all at least one year old, no pullets having been kept last season.

The number of eggs laid by the different breeds up to July 1 is as follows:—

	Eggs laid.
12 B. P. Rocks	775
4 Blk. Minorcas	225
4 W. Leghorns	250
4 White Wyandottes	199

BEES.

Bee-keeping in the maritime provinces has in the past received very little attention, and believing that they confer great benefits to the orchards from the carrying of pollen, besides their value as a revenue producer, further experiments with bees have been made.

On May 22, two colonies were received from the experimental farm at Ottawa, weighing 42½ and 38½ pounds respectively. Quite a number of dead bees were found in each, particularly in the lighter hive. One appeared to be in excellent condition, the other appeared only fairly strong, with little brood in the frames in the latter hive. As the weather continued cold and wet, and not at all favourable to honey gathering, it was considered wise to somewhat retard the stronger hive, and at the same time strengthen the weaker one by removing one frame well filled with brood from the stronger hive, and replacing it with empty frame from the weaker one. This was done on June 14.

From these, four swarms were secured, the first on June 22, second on July 5, third on July 7, and fourth on August 3.

Until after July 3, very little honey was gathered. From July 4 until August 5, all hives gained rapidly in weight, except one parent hive which had swarmed twice. This weak hive continued to dwindle until August 15, when it was completely deserted. After August 9, very little surplus honey was stored by any.

Fifty pounds of honey was taken from those hives August 25; this leaves for winter quarters five hives weighing respectively 55, 53, 54, 59 and 40 pounds.

On November 18 they were placed in the cellar of the superintendent's house, in the corner farthest from the door. This corner was partitioned off with matched lumber for the double purpose of keeping out light and keeping the temperature more uniform, which is at present from 40° to 45°.

The hives were placed on a shelf, one foot from the ground, and rested on 3 empty boxes.

A three-inch block was placed in front, between the bottom board and the brood chamber, making the full entrance three inches high across the front. The wooden covers were removed and replaced with chaff cushions four inches thick, and lapping the sides and ends four inches.

CORRESPONDENCE.

During the year 2,080 letters were received at this Farm, and 1,812 sent out, exclusive of circulars sent with grain distribution and reports.

AGRICULTURAL MEETINGS.

During the year I attended and delivered addresses at the following meetings:—

Winter Fair, Amherst, N.S., December 12 to 15, 1904; Short Course Judging, Truro, N.S., February 23; Nova Scotia Farmer's Association, Truro, N.S., February 27; Dairy School, Sussex, N.B., March 6 to 25; Agricultural meetings at Pugwash, N.S., April 26; Williamsdale, N.S., April 28; Lower Millstream, N.B.

EXHIBITIONS.

An exhibit of the products of the farm was made at Nova Scotia Provincial Exhibition, Halifax, N.S., September 13 to 21; Fredericton, N.B., September 21 to 27; Yarmouth, October 4 and 5. Those exhibits have always been very much appreciated.

VISITORS.

As usual many visitors have been on the farm this year, the largest gathering being the Cumberland County Agricultural Society, July 15.

I have the honour to be, sir,
Your obedient servant,

R. ROBERTSON,
Superintendent.

REPORT OF THE HORTICULTURIST.

(W. S. Blair.)

Nappan, N.S., November 30, 1905.

To Dr. Wm. Saunders, C.M.G.,
Director Dominion Experimental Farms,
Ottawa.

Sir,—I have the honour to submit herewith a report of some of the work done in the Horticultural Department of the Experimental Farm for the maritime provinces during the year 1905.

The winter of 1905 was a severe one and the months of January and February were accompanied by an unusual fall of snow. The fruit and ornamental trees did not suffer from winter killing, but on account of snow drifting over them many were more or less injured by being broken when the snow settled. This trouble, however, was overcome in many cases by shovelling the snow away from a number of the fruit trees that were liable to injury, and in this way the branches were relieved of the heavy weight of snow. Some orchards in these provinces suffered greatly from being broken by the snow which drifted in some cases 10 to 15 feet deep around them, so that when the snow settled trees were in many instances practically stripped of branches.

The early spring was exceptionally late and backward, retarding the blossoming of fruit trees several days. The mean average temperature for May was 1° lower than the average for the past 5 years: For June 1½° lower than that of the past 5 years. The month of July was up to the average in temperature, and August was about 1° lower than the mean average for the past 5 years. September, on the other hand, was somewhat warmer than that of the past 5 years by about ½° in the mean average. The following table gives the mean average temperature for the months of May, June, July, August and September for the past 5 years as compared with that of this season. The rainfall during these months for the past 3 years is also given:—

Month.	Mean Temperature at Nappan.		Rainfall.		
	Average, 5 Years.	1905.	1905.	1904.	1903.
			Inches.	Inches.	Inches.
May	48·04°	47·07°	3·02	1·76	0·68
June	56·06°	54·52°	3·30	1·74	2·29
July	64·22°	64·25°	1·56	2·15	2·07
August	62·32°	61·41°	1·53	3·51	2·40
September	56·08°	55·53°	3·38	4·52	3·63
Total	...	...	14·03	13·68	11·07

The latter part of June and the first half of July was practically ideal weather for all crops. The summer, however, continued too dry after the middle of July and during August for crops to develop properly. Good cultivation during the early part of the season up to the middle of July very materially controlled the moisture supply, and fruit trees so treated apparently suffered little for want of moisture.

The only frosts in May were on the 2nd, 5th, 12th, 13th, 16th, and 23rd, when 32°, 27°, 28°, 22°, 31°, and 31° were recorded, respectively. The only June frost was on the 7th, when 5° was registered. This frost did considerable damage to fruits in blossom at the time; tender plants that had been set out, and to grape vines. The apple blossoms here were not sufficiently advanced to be injured, but cherries and plums suffered so materially that no fruit set. The apples in blossom in the Annapolis and Cornwallis valleys and in other parts of the province of Nova Scotia at this time were greatly injured by the frost. We escaped the usual September frost, although in some sections of the provinces a great amount of damage was done by a frost on August 15, and also by a September frost. The first fall frost recorded here was 5° on October 1.

The apple crop on the Nappan farm was much in advance of that secured in the past. The trees produced a good crop of excellent fruit. The apples developed better than they ever had done before. Many of the trees are of Russian origin, and lack in quality. For cooking purposes most of the Russian sorts are excellent. A number of varieties, such as Scott's Winter, Winesap, Jonathan, Missouri Pippin and Occident produce fruit that averages small and is not very marketable. The Gano, Wealthy and Yellow Transparent are inclined to overbear, and should have the fruit thinned, especially when the trees are young, otherwise it will be small and the trees are liable to be broken from an overweight of fruit.

A report is herewith submitted of some of the varieties of apples that have fruited here.

The strawberry crop was fairly good. The bush fruits were a fair crop.

The ornamental trees and shrubs have made good growth. One hedge of Sea Buckthorn (*Hippophœ rhamnoides*) was set in 1905, in place of Red-leaved Rose (*Rosa rubrifolia*), which made a poor hedge and was removed.

I beg to acknowledge the following donations: From Mr. Frank G. Semple, Brule, N.S. strawberry plants of 'Nick Ohmer,' 'Sample,' 'Splendid' and 'Brandywine.' From Mr. C. W. Smith, Sand Beach, N.S., seedling strawberry plants. From Templin & Co., Calla, Ohio 1 doz. 'Cardinal' strawberry plants. From Mr. Thomas A. Peters, Deputy Minister of Agriculture, Fredericton, N.B., scions of yellow plum which originated near Fredericton. From J. C. Gilman, Esq., Fredericton, N.B., scions of Cranberry Pippin apple. From Mr. F. G. Semple, Brule, N.S., scions of Winter Rose apple. I am also indebted to Mr. W. T. Macoun, Horticulturist, Central Experimental Farm, Ottawa, for 40 additional varieties of strawberry.

I addressed several agricultural meetings in the maritime provinces during the year.

APPLES.

Aport.—Two trees of this variety were planted in 1890. This variety is of Russian origin and is identical with the Emperor Alexander. They have made strong growth, and produced the first crop of any consequence in 1904 when the trees averaged 31½ pecks each. The same trees averaged only 8 pecks in 1905.

Alexander.—Synonym, Emperor Alexander. Three trees were set in 1890. This is a well known strong growing variety. The first crop of any quantity was in 1903 when the trees averaged 8 pecks. In 1904 they averaged 12 pecks, and in 1905, 29·33 pecks. It will be noticed that these three trees are much more regular bearers than the two above called Aport.

Allen's Choice.—One tree only planted in 1898 a strong grower. Fruited in 1905, 2 pecks. The fruit is of medium size, oblate, yellow skin covered over nearly the whole surface with red and striped. Quality good; season January; too small to be of much commercial value here.

Anis.—The variety we have under this name is identical with Yellow Transparent. Two trees set in 1890. These have fruited every other year since 1894. The yield in 1904 was the first large crop, when they averaged 4 bushels each. They produced no fruit this year.

Antonovka.—Two trees of this Russian sort were set in 1897. The fruit is large, yellow, oblong, conical. It is a good cooking sort, and will keep until December. The first large crop was in 1904, when the trees averaged 2¼ pecks. In 1905, 15½ pecks per tree. This variety has no special commercial value.

Arabka.—Synonyms, Arabka Winter and Arabskoe. Two of the former and two of the latter were planted in 1897. They have made strong growth. The first crop of consequence was produced in 1903, when the trees averaged 3·75 pecks. In 1904 they produced an average of 7·94 pecks, and in 1905, 13 pecks. The fruit is large, round, conical, with a green, purplish-red skin. The flesh is greenish white. It is only valuable for cooking; season January. Useful in northern sections where fruit of better quality is tender.

Anisovka.—One tree of this variety was planted in 1890. This is a strong upright grower. The fruit drops badly just as it is about in condition to pull, which is a decided disadvantage. This tree has been top grafted. The fruit is above medium size, roundish, oblate, skin greenish-yellow, streaked and splashed with red. The flesh is crisp and pleasant. Quality good; season September and October.

Ananasnœ.—This is not true to name. It is the same as Anisovka. Two trees were set in 1890. They have fruited well during the past three years. In 1903 they averaged 11 pecks, in 1904, 4 pecks, 1905, 22 pecks. These trees drop their fruit badly just as ripe, otherwise it is a good autumn variety.

Banks.—Synonym, Bank's Gravenstein, Red Gravenstein. This apple is similar in every respect to the well known Gravenstein, except that it is more striped and splashed with red over the yellow skin. Two trees were planted in 1895, and two in 1898. Three of these have since died and the one remaining is not making strong growth. Sunscald and collar rot have been the principal cause of failure. A slight killing back of branches was noted one year. The one tree living, planted in 1898, produced 1 peck of apples this year.

Basil the Great.—Two trees supposed to be this variety were set in 1897. These have made strong growth. The fruit produced, however, show that the trees are Pointed Pipka. In 1903 these two trees averaged 2¾ pecks; 1904, 13½ pecks, and 1905, 16¼ pecks. See Pointed Pipka.

Baxter.—Synonym, La Rue, Baxter's Red. Two trees were set in 1898. They have made fairly strong growth. The trees produced a few apples in 1903-04 and 1905. The growth of this tree is very upright. The fruit is large, round, conical. The skin is yellow, covered over nearly the whole surface with red, and striped with red. This is a promising variety. The fruit is handsome and above the average in quality. Season, December and January.

Beautiful Arcade.—Two trees were set in 1898. They have made good growth. The fruit is round, oblong, with greenish yellow skin. The quality is good. Different from the majority of Russian apples. The flesh is sweet, rich, melting, juicy. Season, September. Fruited, giving only a few specimens in 1904-05.

Bell Pippin.—Two trees were planted in 1897. They have made good growth. The fruit is large, oblate, conical and ribbed; skin greenish yellow, somewhat striped with red. Flesh greenish-yellow; quality fair. Season, December and January. Fruited in 1904, the trees averaging 1 peck. In 1905 they averaged 7½ pecks.

Ben Davis.—Two trees were set in 1893. They have made strong growth, but have not produced well-matured fruit. This is a well known variety which needs no description. The trees averaged 8½ pecks in 1903; 4 pecks in 1904, and in 1905 21 pecks.

Benoni.—Two trees were set in 1890. They have made very strong growth. The tree is a vigorous upright grower. The fruit is small to medium, roundish, oblate, conical. The skin is yellow, red, striped with crimson. Quality very best. This is a variety that is inclined to produce abundantly every second year. The fruit should be thinned on the tree in order to secure a good percentage of marketable fruit. This variety is one of the best hardy dessert apples. Season, October and November. It seems to do well in northern sections, being apparently as hardy as the Duchess, and equal in quality to the Gravenstein. One tree produced ½ peck in 1903; 31 pecks in 1904, and 2 pecks in 1905. The other tree produced 5 pecks in 1903; 1½ pecks in 1904, and 30 pecks in 1905.

Bethel.—Synonym, Uncle Sam. One tree set in 1897 produced the first crop this season, giving 18 pecks. Fruit round, conical, medium to large. Skin greenish-yellow, striped with red. Quality fair. Keeps until March, but looses its character early in the winter. A very hardy strong growing tree. Useful in the colder sections as a hardy winter variety.

Bismark.—One tree planted is making poor growth. Fruit has been produced from grafts. It is medium to large, round, conical. Skin green, striped with red over part of the surface. Quality fair. Season, January. As grown here this variety is not of special value.

Blue Pearmain.—Two trees were set in 1890. These have made strong growth. The fruit is round, conical, medium to large. Skin dark purplish red, striped on crimson ground. Quality good. Season, January and February. This is a good winter variety. One yielded in 1903, 2 pecks; 1904, 9 pecks; 1905, none. The other produced in 1903, 16 pecks; 1904, 13½ pecks, and 1905, 27 pecks.

Borovinka.—This is a Russian variety identical with Duchess of Oldenburg in every particular, except that the fruit does not mature as early by one week. The fact that this variety is a few days later than Duchess makes it possible to extend the season of that apple a little longer. The yield in 1903 was 12 pecks; 1904, 17½ pecks; 1905, 1 peck.

Bottle Greening.—One tree was set in 1891. A strong grower. Fruit oblate, conical. Skin greenish-yellow, with dull red blush. Quality good. Season, January and February. Has so far only fruited lightly. In 1903, 2½ pecks; 1904, 2 pecks; and 1905, a few specimens only. Said to be a good cropper when it gets well established.

Belle de Boskoop.—Tree planted in 1897. A strong grower. Fruited first this season, yielding 4 pecks. Fruit round, oblate, medium to large. Skin yellow, shaded and obscurely striped with red, russeted over nearly the whole surface. Season February and March.

Buckingham.—One tree set in 1895. A fairly strong grower. Fruited first in 1904, yielding 9 pecks; a few specimens only this year. The fruit is oblate, conical and of medium size. Skin greenish yellow, striped, shaded and splashed with crimson. Season, January. Quality excellent. This is a promising sort and apparently quite hardy.

Canada Baldwin.—Three trees were set in 1890. These made the most promising growth at the start of any trees in the orchard. The branches and trunks became sunscalded and gradually the trees have died, until now one only remains. The trees were abundant bearers when healthy. The fruit is oblate, of medium size. Skin greenish yellow, striped and washed with dark red. Season, December and January. Quality good.

Cinnamon Pine.—Two trees were set in 1897. The fruit seems to be identical with 'Anisovka.' These trees are situated in the sheltered orchard and do not drop their fruit so badly as those do more exposed. These averaged 2 pecks per tree in 1904, and 10·75 pecks in 1905.

Crimean Bogdanoff.—One tree set in 1895. Made strong growth. Fruited 1903, 9 pecks; and in 1905, 5 pecks. The fruit is ovate, medium to small. Skin yellow, nearly covered with red, striped. Quality poor. Season, November.

Cross, No. 15 M.—Two trees were set in 1897. They fruited well this season, averaging 12 pecks each. Fruit conical, ribbed, medium. Skin yellow. Quality poor, of no special value.

Danvers.—Synonym, Danver's Winter Sweet. Two trees were set in 1897. The trees are strong upright growers. Fruit oblong, conical, of medium size. Skin greenish-yellow, with dull blush. Quality good, sweet. Season, February and March. Bore their first fruit in 1904, when the trees averaged 3·37 pecks. In 1905, 2½ pecks each.

Derby.—Two trees were set in 1890. Strong growers. They averaged 10 pecks in 1904, and 16 pecks in 1905. The fruit is oblate, of medium size. Skin yellow, sometimes slightly striped with red. Quality good. A good cooking and fair dessert variety. Season, January and February.

Domine.—One tree planted in 1895. Tree a fair grower. Fruited for the first time in 1904, yielding 4 pecks. Few specimens in 1905. Fruit oblate, of medium size. Skin greenish-yellow, partly covered with stripes of light red. Quality good. Season, February and March.

Duchess.—Synonyms, Oldenburg, Duchess of Oldenburg, New Brunswicker. A well known and popular variety that needs no comment. Two trees set in 1893 averaged 7 pecks in 1903, 11 pecks 1904 and 17¾ pecks in 1905.

Enormous.—One tree was set in 1897. Made strong growth. Fruited first crop of quantity this season, yielding 10 pecks. Fruit very large, round. Skin yellow; quality fair. A Russian variety. It is fit for cooking by the middle of August, when it can be picked with profit. The fruit is ripe early in September and drops easily. Valuable as a very early cooking sort.

Fameuse.—Synonym, Snow, Snow Apple. Four trees were set in 1890. These have made strong growth. They bore their first crop of any quantity in 1903, averaging 6½ pecks. In 1904 they averaged 11·62 pecks, and in 1905, 9·25 pecks. The fruit is oblate, medium. Skin greenish yellow, nearly covered with red and crimson. Quality the very best. Season, November and December. One of the best dessert apples grown. Tree, hardy; fruit very liable to attack of apple scab, which may be kept in check by spraying with Bordeaux mixture.

Fanny.—Two trees were set in 1897. These have made fair growth. Fruited last season for the first time. Average yield of tree, 1904, ¾ galls.; 1905, 2·88 pecks. Fruit medium to large, round, oblate, conical. Skin dark red and crimson. Quality fair. Season, December and January. A promising variety.

Gano.—Two trees were planted in 1897 and two in 1898. These have made very strong growth. One of those set in 1897, when carrying about 6 pecks of fruit was struck by a strong wind and broken so badly that it was removed. The other tree yielded 5 pecks in 1903, 13¼ pecks in 1904, and 29 pecks in 1905. The fruit is round, conical, medium to large. Skin greenish yellow, covered with dark red. The two trees set in 1898 averaged 3 pecks in 1904 and 2½ pecks in 1905. The fruit of these two trees is roundish, oblate and not so evenly coloured as the above, being somewhat more striped. The first set trees more closely resemble the Black Ben Davis, and the latter are more like Gano. The fruit is similar in quality and very closely resembles the well known Ben Davis. These two varieties, however, mature here much better than the Ben Davis.

Grandmother.—Two trees were set in 1897. The trees are upright and vigorous growers. Fruit oblate, conical, medium to large. Skin greenish white, streaked and splashed with light red. Quality good. Season, September; of Russian origin. Fruited in 1905, averaging 4½ pecks. Two trees set at the same time called *Avenarius* are the same as Grandmother. A fairly good dessert variety.

Grimes.—Synonym, Grimes' Golden. This is a good growing hardy variety, coming into fruit early. The fruit, however, runs small here. The tree is a good producer and the apple an excellent dessert sort. Season, January and February. Skin, yellow. A winter dessert apple of good quality for home use or local market.

Haas.—Synonym, Fall Queen. These trees were set in 1890. One has been top grafted. A strong grower. Fruit oblate, conic, of medium size. Skin greenish yellow, nearly covered with light red and striped with darker red. Quality poor. Season December. Average yield 1903, 9¾ pecks; 1904, 10 pecks, and 1905, 22 pecks. Not a desirable variety.

Hibernal.—This is a very hardy, vigorous, Russian variety of spreading habit, and one of the hardiest for extreme northern sections. Fruit oblate, conic, large. Skin greenish yellow, with dull bronze red on the sunny side. Valuable only for cooking, for which it is one of the best. Fruit hangs to the tree well and ripens evenly. Season, November and December. Tree planted in 1896 produced 3 pecks in 1903, 12 pecks in 1904, and 16½ pecks in 1905.

Hurlbut.—Synonym, Hurlburt. The two trees set in 1897 have made fair growth They bore a good crop in 1904, averaging 8½ pecks, and in 1905, 7 pecks. The fruit is medium to large, oblate, conical. Skin yellow, splashed and striped with red. Quality good. Season, January. This is a variety that should be more largely planted.

Jonathan.—Two trees were set in 1890. They have made fair growth. They fruited in 1903, averaging 3 pecks per tree. In 1904, 4 pecks, and in 1905, 9½ pecks. The fruit as grown here is small to medium, roundish, oblong, conical. Skin yellow, nearly covered with bright red and shaded into dark red in the sun. Quality good. Season, January to April. This variety, while of excellent quality, is sometimes too small to be profitable.

Keswick.—Synonym, Keswick Codling. Three trees set in 1890. One has been top grafted. They have made good growth. The two fruited, bearing an average of 21 pecks in 1903; 12 pecks in 1904; 34 pecks in 1905. Fruit round, oblong, conical, of medium size. Skin greenish yellow, sometimes slightly blushed in sun. Valuable only as a cooking apple. Season, October and November. Inclined to run small from setting too much fruit. Should be thinned. Not recommended.

Longfield.—Three trees were set in 1890. They have made strong growth and have fruited abundantly. The fruit is round, oblong, conic, small to medium. Skin yellowish white, with blush on sunny side. Quality good. A rather pleasant eating apple and good for cooking. Very hardy. Season, November and December. Useful for extreme northern sections.

McIntosh Red.—Three trees were set in 1890. They have made fair growth. Two trees set as 'Princess Louise' in 1892 have turned out to be McIntosh Red. They have made strong growth. The first trees planted yielded in 1903 an average of 7·67 pecks per tree; in 1904, 5·33 pecks, and in 1905, 25 pecks. The last set yielded an average of 2 pecks in 1904, and 12½ pecks in 1905. This variety has done well since 1903. The fruit has developed perfectly, and this apple may be regarded as one of the very best apples growing on the farm. This variety belongs to the Fameuse group, and is liable to scab if not carefully sprayed with Bordeaux; of fine quality for dessert. Season, December and January. Tree perfectly hardy, a good grower and productive. Fruit round, oblate, slightly irregular, medium to large. Skin whitish yellow, covered over nearly the whole surface with dark, rich wine red, shading to pinkish crimson in the shade. Should be more largely grown.

McMahan.—Synonym, McMahan White. One tree was planted in 1897. A very strong, vigorous grower. Fruit large, conical. Skin whitish-yellow. A good cooking sort. Season, December. One of the best growing trees for top grafting. An excellent sort for northern sections. Yielded in 1903, 5 pecks; 1904, 13½ pecks; in 1905 a few specimens only.

Melonen.—Synonym, Melon. One tree was planted in 1897. A strong grower. Fruited in 1904, 9¼ pecks, and in 1905, 18 pecks. Fruit oblate, of medium size. Skin yellow, somewhat striped with red. Season November. Quality poor. Of Russian origin. Fruit drops badly just before it is fully matured. Of little value.

Missouri.—Missouri Pippin. Two trees were set in 1897. Made strong growth. They averaged 5 pecks of apples in 1903, 5 pecks in 1904, and 6¾ pecks in 1905. Fruit round, oblate, medium to small. Skin greenish yellow, splashed and striped with light and dark red. This variety has so far not succeeded well here, it grows too small to be profitable.

Northern Spy.—One tree planted in 1892 has made strong growth. It fruited well this season, the first good crop, yielding 12 pecks. A well known strong growing variety. One of the best winter sorts.

Northwestern Greening.—Two trees were set in 1897. They made very strong growth at the start, but have not proved a success. One had to be taken out in 1903 and the other was removed this season. The trouble seems to be that the wood is not strong enough to support the branches, which break easily with the weight of fruit; or with ice or snow lodging on the branches after a sleet storm. These trees produced good crops in 1902-03 and 1904. The fruit is large, round, conical, and of even size. Skin greenish yellow. Quality fair. Season said to be January and February; with us this fruit goes bad at the core after the last of January, or in some cases even earlier. Two other trees of this sort have been planted to give it a further test.

Ontario.—One tree was set in 1890 and one in 1897. These have made fair growth. The trees came into fruiting early. The first ones planted bore a good crop, 11½ pecks in 1903, in 1904, ¾ peck, and in 1905, 21 pecks. The last tree planted fruited, bearing 4½ pecks in 1903, a few only in 1904, and 7 pecks in 1905. This tree has been sunscalded during the past winter. It is useful principally for cooking. The fruit is oblate, conic, large. Skin whitish-yellow, red and striped. Season, January and February.

Ostrakoff.—Two trees of this variety were set in 1890. They have made strong growth. The average yield of these trees was 5 pecks in 1903, 21¼ pecks in 1904, and 12¼ pecks in 1905. The fruit is not of high quality and drops badly just before thoroughly matured. This sort is the same as the varieties planted as *Sultan* and *White Astrachan,* which have the same fault. Neither of these sorts are valuable. The fruit is oblong, conical, of medium size. Skin yellow, somewhat streaked with red. Season, September.

Patten.—Synonym, Patten's Greening, Patten's Duchess. Two trees were set in 1897. These have made strong growth. A seedling of Duchess. They come into fruit early. Average yield in 1903, 3¾ pecks; 1904, 9·37 pecks, and 1905, 8¼ pecks. Fruit large, of even size, roundish, oblate. Skin yellowish-green, with a bronze blush in the sun. A good cooking variety. Season, December and January. A good sort for northern sections. Tree very hardy.

Peter.—This variety, as grown here, so closely resembles the Wealthy apple that we consider it the same.

Pewaukee.—Three trees were set in 1890, 2 in 1891 and 2 in 1892. These have all made very strong growth, this variety being one of our best growing trees. A well known winter apple of fair quality, but of a greenish colour, which is against it for market purposes. It is useful principally for cooking. Season, December. The fruit has the bad fault of dropping easily just before fully matured. Two trees in the orchard, protected with shelter of natural spruce, yielded in 1903 an average of 3½ pecks of dropped fruit, and 6 pecks were picked. Three trees in the unprotected orchard yielded in 1903 an average of 10 pecks of dropped fruit and 8 pecks picked. In 1905 the two trees in the protected orchard averaged 26¾ pecks picked and 1¾ pecks dropped, and in the unprotected orchard 3 trees averaged 13 pecks picked, and 2·33 pecks dropped. The season of 1904 was exceptional for winds.

Pointed Pipka.—Four trees were set in 1896. These have made very strong growth. The fruit is medium to large, oblong, conical. Skin whitish-yellow, streaked and splashed with bright red. Flesh white, good. Season last of September. A fairly good dessert apple of Russian origin. Same as the variety called Basil the Great. Tree very hardy.

Red Canada.—Synonym, Canada Red. Two trees were set in 1890. One cankered badly, made poor growth and was removed. The other has made good growth. It fruited in 1903, bearing 7½ pecks; 1904, 2¼ pecks, and in 1905, 14 pecks. The fruit is oblate, conical, of medium size. Skin greenish-yellow, covered nearly with red and striped with crimson. Quality good. Season, February and March. This is a good winter sort, and the tree is very hardy.

Russian Tyrol.—One tree was set in 1895, has made strong growth. This is identical with Longfield, already described.

Scott's Winter.—Two trees were set in 1890. They have made strong growth and came into bearing early. They averaged 13 pecks in 1903; 5½ pecks in 1904, and 6¼ pecks in 1905. The fruit is round, conical, small. Skin red striped. Quality fair. Season, February and March. The fruit of this variety is too small for general market purposes. Of value only for home use in northern sections, where other winter sorts will not succeed.

Serinkia.—Two trees were set in 1890. They have made good growth. Fruited in 1903 averaging 13½ pecks per tree. In 1904, 2·12 pecks, and in 1905, 25 pecks per tree. The fruit is of medium size, round, oblate. Skin pale yellow, somewhat striped with red. Quality fair. Season, October. A fairly good cooking and eating fruit.

Sunbeam.—One tree was set in 1897. This is a vigorous grower, and productive. It yielded in 1904, 25 pecks, and in 1905, 25½ pecks. The fruit is of medium size, roundish, conical. Skin whitish green with a blush in the sun. The fruit drops badly just before fully matured. Quality fair. Season, November and December.

Thaler.—Synonym, Charlotten-Thaler. This seems to be identical with Yellow Transparent, with the exception that it may be a few days earlier.

Titovka.—Synonym, Titus apple. Two trees were set in 1890. They have made strong growth. Fruited in 1904, bearing 17½ pecks per tree, in 1905 a few specimens only. The fruit is large, oblate, oblong. Skin greenish-yellow, often nearly covered with deep red, striped with dark red. Quality fair. Season, September. This is a good cooking apple. The variety, Little Hat, resembles this and is probably the same.

Wellington.—Two trees were set in 1893. They have made strong growth. They averaged per tree in 1903, 18 pecks; 1904, 8 pecks, and 1905, 24½ pecks. The fruit is of medium size, round, oblate. Skin yellow with blush on sunny side. Very acid. Quality good. Season, February to April. Valuable only for cooking. Liked on the English market on account of its pleasant acidity. A valuable commercial sort. Inclined to overbear, and run small. Should be thinned.

Williams.—Synonym, Williams' Favourite, Williams' Early. Two trees were set in 1897. These have made good growth. They fruited in 1903, averaging 1 peck per tree; 1904, 3¼ pecks, and 1905, 8¼ pecks per tree. The fruit is medium to large, round, oblong, conic. Skin light red ground, but nearly covered with a dark red, striped somewhat. Quality good. Season, September. An excellent dessert market sort, and very attractive on account of its fine colour.

York Imperial.—One tree was set in 1897. It has made fair growth and fruited first in 1902. Fruited in 1904, 2¾ pecks; 1905, 12 pecks. The fruit is medium, oblate, oblique. Skin yellow, shaded with crimson, and indistinctly striped with red. Quality fair. Season, February to April. Somewhat inclined to be undersized.

Yellow Transparent.—A well known early variety. A valuable cooking apple, useful only for local markets and home use. A good eating apple when fully ripe. Five trees set in 1890 have made fair growth. They have fruited well. The average yield from these trees is as follows:—1903, 2¼ pecks; 1904, 5·6 pecks; and 1905, 13·7 pecks. These set their first fruit in 1893. Trees hardy. Season, last of August.

SOIL MOISTURE EXPERIMENTS.

Experiments to determine the moisture contents of soils when cultivated, as compared with those cropped were again conducted this season. The experiment included six different plots, each 25 feet wide and 400 feet long. Samples of the soil from these plots were taken at intervals of two weeks during the season to a depth of 14 inches by using round galvanized iron canisters which were driven into the ground to that depth and the column of soil removed. These samples were sent to Ottawa, where they were examined in the chemical laboratory of the Experimental Farms, and their moisture contents determined. The plots were alongside each other and the soil was of a fairly uniform character.

Plot No. 1.—The soil of this plot was in strawberries in 1903-04. The ground was ploughed early in the fall of 1904. It was thoroughly worked up on May 16 with the disc and springtooth harrows, and again once worked with the springtooth harrow before seeding to oats on May 23. The grain was sown with the seed drill at the rate of 3 bushels per acre. The growth of straw was good, averaging 36 inches. The crop suffered greatly for want of rain during the latter part of its growth and as a consequence the seed did not fill out well. The crop was harvested September 2. The ground had been seeded to timothy and clover with the oats. The grass and clover seed started fairly well, but owing to the dry weather at this date, October 30, there is not sufficient growth to cover the ground.

Plot No. 2.—The ground of this plot was in oats during 1904, having been seeded to clover and timothy with the oats in the spring of that year. The growth of clover this season was good, and the crop was cut for hay July 20, having made a growth of from 34 to 38 inches, averaging 2½ tons per acre.

Plot No. 3.—This plot was also in oats in 1904, having been seeded to timothy and clover in the spring of that year. The growth of clover was similar to that on plot No. 2, which it adjoined. This plot was cut with the mower when the crop was about 12 inches high on June 16, and the crop allowed to remain as a mulch. The clover was fairly thick. The plot was cut a second time July 8, when about the same growth had been made. The clover was again left as a mulch, which was fairly thick. The intention was to cut again in two or three weeks; but owing to extremely dry weather very little more growth was made during the season, and the crop was not again cut. The material left as a mulch soon dried out and was of very little use in conserving moisture.

Plot No. 4.—The ground of this plot was in strawberries in 1902-03 and '04. The ground was well worked up with the disc and springtooth harrows on May 16, 1905. It was again harrowed on May 23 with the springtooth harrow. On June 6 and 15 this ground was again harrowed, and on the latter date crimson clover at the rate of 30 pounds per acre was drilled in with the seeder. This made a quick start and soon covered the ground. The growth averaged about 13 inches by the middle of August. Very little growth was made after that date, the ground being practically dried out.

Plot No. 5.—The ground of this plot was previously treated as plot No. 4, it having been in strawberries and was ploughed early last fall. In 1905 this ground was cultivated in the same manner as plot No. 4, during the first part of the season, viz., until June 20, when it was thoroughly worked up with a land grubber to a depth of 5 inches. The soil was again worked with the springtooth harrow on July 4 and 20, and at the latter date crimson clover at the rate of 25 lbs. per acre was sown broadcast and harrowed in with the springtooth harrow. The clover started rather slowly, but has made a thick growth of about six inches, which thoroughly covers the ground at this date, October 30.

Plot No. 6.—The ground on this plot was treated as plot No. 5 in every respect, except that no cover crop was sown, and the land was left without any cultivation whatever after July 20. A few weeds started up on this ground, otherwise no plants were growing on it.

The moisture contents of these differently treated plots is given in the following table:—

PERCENTAGE OF MOISTURE IN PLOTS.

Date when Samples were taken.	Plot No. 1.	Plot No. 2.	Plot No. 3.	Plot No. 4.	Plot No. 5.	Plot No. 6.
	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
May 15	17·40	16·04	17·33	16·50	16·28	17·76
June 1	16·37	14·23	13·83	15·25	16·97	14·74
" 16	15·54	14·88	15·94	16·19	15·78	18·02
" 29	16·30	19·06	18·52	17.50	17·97	17·92
July 17	11·02	8·08	11·77	13·89	15·65	14·59
August 2	5·63	7·26	7·12	9·73	15·50	15·02
" 15	5·17	5·91	5·64	7·87	14·11	14·03
" 30	5·01	4·17	4·37	5·26	9·97	14·36
September 18	12·66	10·52	12·58	11·47	14·68	16·31
October 3	11·22	9·05	10·61	9·24	12·67	13·06
" 18	9·34	6·71	8·01	6·69	9·44	11·34

The object of this investigation was to learn to what extent the failure of fruit trees to grow properly in soils cropped with grains and grasses is due to a lack of moisture. It is a well known fact that trees growing in soil having an abundant supply of plant food may not in some seasons produce well or make satisfactory growth if grass or grain crops occupy the orchard soil at the same time. These latter crops are especially exhaustive of soil moisture, large quantities of which are used in their development, consequently the soil is, as these experiments show, rendered too dry for the proper development of trees which require the whole season for their growth.

Plot No. 4 was seeded to crimson clover to determine whether sufficient moisture would be conserved by cultivating only to the middle of June and then seeding to a cover crop in place of following the usual practice of cultivating to the middle of July and sowing a cover crop. It was also desired to ascertain if the crop of crimson clover would shade the ground sufficiently to act as a mulch, and lessen evaporation from the soil surface, and in this way offset the loss by transpiration. It would appear in this connection, however, that the moisture taken from the ground by the plants was far greater than that conserved by them through the shade afforded by the foliage. The figures given show that this plot was too dry for proper plant development during the greater part of the season.

It will be seen that in plot No. 6 at no time during the season did the moisture fall below 10 per cent. It will also be noticed by referring to the above table that plot No. 5 only twice went below 10 per cent. This would seem to show that even in a season as dry as that of 1905, cover crops of crimson clover sown after the middle of July, on soil that has previously been properly cultivated to conserve moisture, will not dry out the ground to such an extent as to prevent a proper development of fruit and wood growth. It is apparent that the conditions prevailing in plots Nos. 1, 2 and 3, so far as moisture content is concerned, were not at all favourable for fruit tree development, and consequently the growing of grass or grain crops in the orchard is not advisable if best results are to be obtained.

The season has been exceptionally dry, especially since June. The following table gives the rainfall and the date on which the rain occurred from April 1 to November 1, 1905:—

RAINFALL, 1905.

April.		May.		June.		July.		August.		September.		October.	
Date.	In.	Date.	In.	Date.	In.	Date.	In.	Date.	In.	Date.	In.	Date.	In.
1	08	2	·76	2	·34½	2	·45	1	·06	4	1·33	9	·04
21	·40	4	·04	3	·05	3	·12	2	·10½	5	·15	11	·05
22	·62	7	·18	6	·65	15	·82	4	·12	6	·44	18	·26
25	·14	8	·40	8	·12½	26	·08	7	·62	13	·04	19	·19
		10	·74	12	·07	27	·03	23	·03½	14	·85	20	·19
		18	·50	13	·44	31	·06	30	·59	18	·04	21	·15
		20	·14	14	·12					19	·05	22	·33
		21	·11	17	·04					26	·48		
		23	05	18	·12								
		30	·10	26	·11								
				27	·92								
				28	·31								
Total..	1·24	..	3·02	..	3·30	..	1·56	..	1·53	..	3·38	..	1·29
Total Rainfall for the same period in 1904 and 1903.													
1904...	2·92	..	1·76	..	1·74	..	2·15	..	3·51	..	4·52	..	5·00
1903...	3·57	..	·68	..	2·29	..	2·07	..	2·40	..	3·63	..	5·78

EXPERIMENTS TO CONTROL THE PEA WORM.

Acting on the advice of Dr. Jas. Fletcher, Entomologist and Botanist of the Dominion Experimental Farms, Ottawa, some experiments were conducted this season to ascertain whether spraying pea vines and pods with a paris green mixture would prove a satisfactory remedy for the pea worm.

The strength of mixture used on the early plots was ¼ pound paris green to 40 gallons of water, to which one pound of whale oil soap was added so that the mixture would adhere to the plant better. One plot of the variety Heroine was treated later with a stronger solution of paris green and water, ½ pound paris green to 40 gallons of water being used. The plots were once sprayed thoroughly just after the pods were formed, except the plot of Heroine, which in addition to being sprayed on July 20 with the ¼ pound paris green to 40 gallons of water, was again sprayed July 29 with ½ pound paris green to 40 gallons of water.

The results obtained would seem to indicate that spraying the plants with a paris green solution just as the pods are beginning to form is too early in the growth of the plant to get the best results.

It will also be seen that early varieties of pease are much less liable to injury from the pea worm that the later sorts, and pease which are fit to use from the first to the middle of August are the most injured by the pea worm.

The following results were obtained:—

Variety Treated.	Date when sprayed.	Date when pulled.	How Treated.	Number of pods shelled.	Per cent wormy.
Alaska	July 8	July 20	Paris green	500	4
			None	500	3
Gradus	" 15	" 25	Paris green	500	7
			None	500	8
American Wonder	" 20	Aug. 1	Paris green	500	11
			None	500	11
Heroine	" 20 and 29	" 17	Paris green	500	22
			None	500	27

STRAWBERRIES.

In addition to the small plots of strawberries set in the spring of 1904, several larger plots of some of the most promising varieties were planted. Each plot consisted of two rows set 3 feet apart, and one foot apart in the rows. The runners were allowed to spread and at the end of the season the two rows had made sufficient growth to cover the ground between the rows fairly well. The runners on the outside of these two rows were kept cut one foot from the rows. This made practically a matted row 5 feet wide of each plot.

The ground was a light sandy loam, which had not been manured since the spring of 1899, after which a crop of corn was taken off. The soil was well worked up and complete fertilizer and bone meal in equal parts at the rate of 800 lbs. per acre was used by sowing it broadcast and harrowing in before the plants were put out. The planting was done May 23.

The Warfield and Senator Dunlap have as usual given the best results. The Glen Mary and Clyde are two good sorts for local markets, but are too soft for shipping to any distance. The Lovett is rather small, otherwise is a good berry. The Beder Wood did not do as well as usual. The fruit was small and the plants not at all vigorous. The Howard No. 41 is not a desirable sort. The Warfield is inclined to run small towards the last pickings, and the plants are not very vigorous. The fruit stands shipment well, and as the plant is prolific and the fruit takes well in the market we consider it one of the best commercial varieties here. The Senator Dunlap is an excellent berry and may be recommended for commercial planting. The fruit is medium to large, conical, occasionally flattened slightly or ribbed; colour a dark rich crimson. Flesh firm and fine in texture, red throughout. Quality good, sprightly. Flowers perfect, having abundant pollen. The plants are strong, vigorous growers, probably the best berry we have yet tested here.

Three varieties of the Alpine, or perpetual strawberry have been tested during the past 4 years. They were St. Joseph, St. Antoine and Jeanne d'Arc. The quality of this fruit is excellent, but outside of that there is nothing to recommend them. The fruit is small. The plants are not everbearing; in fact, they have a shorter season with us than many of the commonly cultivated varieties. They are of no value from a commercial standpoint.

The size of these plots and the dates on which the fruit was picked, together with the yield per acre as calculated from the quantity produced on the plots, is given in the following table:—

STRAWBERRIES—TEST OF VARIETIES.

Variety.	Flowers.	Date when Picked.						Total Yield.	Size of Plot.	Yield per Acre.
		July 10.	July 13.	July 16.	July 20.	July 24.	July 28.			
		Qts.	Qts.	Qts.	Qts.	Qts.	Qts.	Qts.	Feet.	Qts.
Senator Dunlap..........	Per.	23	37	69	51	8	9	197	5 x 148½	11,557
Warfield..................	Imp.	22	29	82	18	24	4	179	5 x 148½	10,501
Glen Mary..................	Per.	......	2	28	12	12	7	61	5 x 66	8,052
Lovett....................	Per.	9½	13	10	12	14	2	60½	5 x 66	7,986
Clyde	Per.	......	7½	18	7	7½	......	40	5 x 49½	7,040
Beder Wood	Per.	9	13	12	11	6	4	55	5 x 82½	5,808
Howard's No. 41	Imp.	4	7	13	5	......	......	29	5 x 49½	5,104

GARDEN PEASE.

Fifty-two varieties of garden pease were tested this year. The plots were on soil of a uniform character, and in a fair state of fertility. The seed was sown in rows 2½ feet apart, May 6, and the pease were planted about 2 inches deep and 2 inches apart in the rows. Each plot was 2 rows 16½ feet long. One row was allowed to ripen seed, and on the other row the pease were picked when fit for market, and the quantity of marketable green pods obtained. The following table gives the yield from these plots, together with other notes taken on the varieties.

The variety Early Excelsior is an exceptionally early and valuable dwarf pea. Thomas Laxton continues to give best results as a second early sort. The extra Early Leviathan about the same season as Thomas Laxton, is not as good, judging from one test. Carter's Early Morn is practically the same as Gradus. The variety Rivenhall Wonder is a fine medium late kind. Juno is the best late kind tested.

GARDEN PEASE—TEST OF VARIETIES.

Variety.	Length of Vine.	Length of Plot.	Number of Peas in Pod.	Date of Picking.				Total Yield from Plot.	
				July 24.		July 31.			
	Inches.	Inches.		Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.
Alaska	36	2¼ to 2¾	5 to 7	5	2	..	10	5	12
Station	36	2¼ ″ 2¾	5 ″ 7	6	10	..	8	7	2
New Surprise	36	2¼ ″ 2¾	5 ″ 7	7	..	..	9	7	9
Gregory's Surprise	36	2¼ ″ 2¾	5 ″ 7	6	8	1	4	7	12
Early Excelsior	18	3¼ ″ 3¾	5 ″ 7	5	4	4	9	9	13
Burpee's Extra Early	34	2½ ″ 2¾	5 ″ 7	5	11	2	..	7	11
Chelsea	20	3 ″ 3½	6 ″ 8	4	6	2	3	6	9
Electric Light	27	3 ″ 3½	5 ″ 8	4	..	4	9	8	9
First and Best	39	2¼ ″ 2¾	5 ″ 7	3	3	2	13	6	..
				July 28.		Aug. 4.			
Gradus	40	3½ ″ 4¼	5 ″ 8	5	10	2	2	7	12
Prosperity	40	3½ ″ 4¼	5 ″ 8	6	8	1	2	7	10
Thomas Laxton	40	3 ″ 3½	5 ″ 8	6	3	5	5	11	8
Nott's Excelsior	18	2¾ ″ 3	5 ″ 8	3	2	3	12	6	14
A I	40	3 ″ 3½	5 ″ 7	5	4	5	2	10	6
Nott's Excelsior	20	3 ″ 3¼	5 ″ 8	4	..	5	11	9	11
Philadelphia	36	2½ ″ 2¾	6 ″ 7	5	..	2	..	7	..
Claudit	42	3½ ″ 3¾	6 ″ 9	6	2	4	8	10	10
Early Morn	36	3¼ ″ 3¾	6 ″ 8	4	..	1	4	5	4
William Hurst	18	3 ″ 3½	6 ″ 8	3	8	6	12	10	4
Premium Gem	22	2½ ″ 3	5 ″ 7	2	10	3	..	5	10
Dwarf Wrinkled Sugar	22	2¾ ″ 3	5 ″ 7	3	6	2	12	6	2
				July 31.		Aug. 7.			
Prolific	37	2¾ ″ 3¼	6 ″ 8	4	5	5	8	9	13
Sutton's Excelsior	20	3 ″ 3½	5 ″ 7	5	4	1	..	6	4
Sutton's Forcing	18	2½ ″ 3	3 ″ 7	3	..	1	2	4	2
Melting Marrow	20	2¾ ″ 3¼	5 ″ 7	2	4	1	5	3	9
King of Dwarfs	22	2¾ ″ 3	5 ″ 7	6	4	1	..	7	4
				Aug. 7.		Aug. 14.			
New Second Early	45	3¼ ″ 3½	8 ″ 10	6	..	2	3	8	3
Rivenhall Wonder	20	3½ ″ 4	6 ″ 9	6	4	2	6	8	10
British Wonder	20	3¼ ″ 3¾	5 ″ 7	5	4	3	12	9	..
Admiral Dewey	55	4 ″ 4¼	6 ″ 8	11	4	1	8	12	12
Boston Unrivalled	55	3¾ ″ 4¼	6 ″ 8	10	8	3	2	13	10
Improved Senator	48	4 ″ 4¼	6 ″ 8	5	0	2	1	7	1
						Aug. 17.			
Horsford's Market	30	3 ″ 3¼	5 ″ 7	3	4	8	11	11	15
McLean's Advancer	30	2¾ ″ 3¼	5 ″ 7	3	4	8	2	11	6
Prodigious	55	4 ″ 4¾	7 ″ 9	9	12	2	10	12	6
Prince Edward	42	3¾ ″ 4¾	6 ″ 9	9	12	2	3	11	15
Duke of Albany	42	3¾ ″ 4¼	6 ″ 8	4	10	4	13	9	7
Dwarf Champion	22	3½ ″ 3¾	6 ″ 8	2	6	2	14	5	4
American Champion	57	3¼ ″ 3¾	6 ″ 8	2	8	6	14	9	6
Dwarf Telephone	20	3¼ ″ 3¾	6 ″ 8	2	3	3	9	5	12
				Aug. 12.		Aug. 17.			
Champion of England	57	2¾ ″ 3½	6 ″ 8	4	..	4	8	8	8
Duke of York	56	3½ ″ 3¾	6 ″ 8	4	6	5	..	9	6
Abundance	30	3 ″ 3¼	6 ″ 8	2	..	4	8	6	8
Yorkshire Hero	34	3 ″ 3½	5 ″ 7	2	..	4	1	6	1
Stanley	41	3¾ ″ 4½	6 ″ 7	3	4	4	7	7	11
Hurst's Reliance	46	3 ″ 3½	7 ″ 8	4	8	2	6	6	14
Perfection	47	3 ″ 4	6 ″ 9	3	..	6	..	9	..
Magnum Bonum	34	4 ″ 4½	6 ″ 8	3	8	8	2	11	10
				Aug. 14.		Aug. 21.			
Daisy	24	3¾ ″ 4½	7 ″ 9	3	4	3	5	6	9
Juno	24	3½ ″ 4	7 ″ 9	6	..	5	9	11	9
Telephone	50	3½ ″ 4½	6 ″ 8	5	3	5	5	10	8
Fillbasket	24	3¾ ″ 4¼	7 ″ 9	5	..	5	..	10	..

GARDEN PEASE—SINGLE VS. DOUBLE ROWS.

Eight varieties of garden pease were sown in plots 33 feet long, each plot occupying an area 2½ feet wide. In one set of plots one row was planted down the centre of the plot, and in the other series 2 rows 6 inches apart were planted down the centre of the plot. The object of the experiment was to determine the gain, if any, of planting 2 rows of garden pease together instead of only one. The double rowed plots require much greater labour in hoeing, whereas in the single rows very little hand hoeing is necessary, the work being done with a horse and cultivator.

The yield was greater in the double rowed plots, and the general appearance of the plots for market decreased in value in proportion to the thickness of the vine growth on the double rowed plots. In the remarks on the general appearance of the pods when gathered, 10 points is taken as a standard of perfection. It will be seen that the dwarf kinds, Nott's Excelsior and American Wonder, were much more perfect in the double row plots than the variety Heroine. This was due to the much greater vine growth of the latter, which prevented proper development of pods when the vines trailed on the ground.

The yield from these plots is given in the following table:—

SINGLE VS. DOUBLE ROWS OF GARDEN PEASE.

Variety.	Kind of Row.	When Picked.				Total Yield from Plot.		Taking 10 as point of Excellence.
		July 24.		July 29.				
		Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	
Surprise	Double	12	7	3	4	15	11	9½
"	Single	6	8	1	2	7	10	10
Station	Double	12	10	5	..	17	10	9½
"	Single	8	14	1	4	10	2	10
		July 28.		Aug. 4.				
Prosperity	Double	13	6	2	12	16	2	8
"	Single	8	11	1	2	9	13	10
Gradus	Double	16	10	2	..	18	10	8
"	Single	8	8	..	10	9	2	10
Thomas Laxton	Double	17	10	1	..	18	10	8½
"	Single	13	..	..	12	13	12	10
		July 31.		Aug. 7.				
Nott's Excelsior	Double	19	4	....		19	4	10
"	Single	11	12	....		11	12	10
American Wonder	Double	15	8	2	4	17	12	9½
"	Single	8	8	2	..	10	8	10
		Aug. 7.		Aug. 17.				
Heroine	Double	12	..	8	12	20	12	6½
"	Single	8	6	3	4	11	10	9

GARDEN PEASE—STAKED VS. NOT STAKED.

The object of this experiment was to determine the value of putting stakes 6 inches apart for the pea vines to cling to in place of letting them go on the ground. Stakes of alder bushes about 4 feet long with many of the branches left on were used. One series of these plots consisted of single rows 2½ feet apart, and the other series consisted of two rows planted 6 inches apart and 2½ feet from the center between these two rows to the center between the next two rows. The plots were all treated in a similar manner. They were all cultivated alike, and were sown at the same time. The stakes were stuck when the plants were 6 inches high.

It will be seen from the results that the yield from the single rows staked was not very materially greater than those not staked. The double rows, however, gave a better crop than the single ones. It was also quite apparent that the pods from the staked plots were much superior to those from the unstaked plots. This was especially the case with the double rows. This was no doubt due to the fact that when the vines are trailing on the ground the pods do not have the conditions so favourable for their development as they do when supported, and a single row not staked has a much better chance for proper development than two rows occupying practically the same space.

From the information obtained, it would appear to be safe to conclude that in small gardens it is a decided advantage to stake even half tall varieties and that to plant two rows 6 inches apart and allow a 2-foot space to the next row is much preferable to a single row 2½ feet apart, and produces about double the crop. On the other hand, the same number of stakes required for a single row will stake a double row by setting the stakes between the two rows. There is more difficulty in hoeing when double rows are planted. In large areas for market the most economical method is to run single rows 2 feet apart, and they can be so cultivated that very little hand hoeing is necessary. In large commercial areas staking the vines would be impracticable.

The following yields were obtained from these plots, each of which was one row 33 feet long. The yield per acre is calculated from the quantity obtained from these plots, and the bushels per acre was computed by allowing 40 pounds to the bushel. The variety used was Thomas Laxton, which weighs, of green peas in pod, 40 lbs. per bushel:—

EXPERIMENTS WITH STAKED VS. NOT STAKED GARDEN PEASE.

Variety, Thomas Laxton and how treated.	Date when Picked.				Total Yield per Plot.		Yield per Acre.	Yield per Acre.	
	July 29.		Aug. 4.						
	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Bush.	Lbs.
Staked, single row	14	12	4	4	19	..	10,032	250	32
Not staked, single row	16	6	2	4	18	10	9,834	245	34
Staked, double row	20	..	9	10	29	10	15,640	391	..
Not staked, double row	17	..	2	12	19	12	10,428	260	28

GARDEN BEANS.

Eight of the sorts which have given the best results in the past were sown this year in plots of one row, each 49½ feet long. The rows were 2½ feet apart. The ground on which these were grown was of a uniform character, and in a fair state of fertility. The seed was planted May 29. The following table gives the dates on which the marketable snap beans were picked, and the yield per plot and per acre:—

Variety.	Colour of Pod.	Date when Picked.								Yield per Plot.		Yield per Acre.
		Aug. 4.		Aug. 12.		Aug. 18.		Aug. 25.				
		Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	Lbs.
Bountiful	Green	15	..	10	10	6	..	1	8	33	2	11,660
Market Wax	Golden	6	..	7	8	11	4	6	..	30	12	10,824
Lightning	Green	10	8	12	..	5	..	2	14	30	6	10,692
Davis Wax	Golden	13	4	5	8	7	12	2	8	29	..	10,208
Early Warwick	Green	14	8	5	12	5	4	2	.	27	8	9,680
Low's Champion	"	5	12	5	2	6	12	5	2	22	12	8,068
Extra Early Edible Podded.	"	9	12	6	8	3	..	..	14	21	2	7,436
Longfellow	"	4	..	3	3	4	12	5	4	17	3	6,050

The variety Bountiful is one of the best green pod market beans tested here. The Lightning is a splendid variety, and it is especially rust-resistant, being much more so than the Bountiful. The Davis Wax rusted badly this year, as did the Keeney's Rustless Wax. The early Giant Wax and Best of All both are fine sorts. The Market Wax again proved to be equal to any of the golden podded varieties. Valentine Wax is a very prolific round Golden Pod variety. Longfellow we would not recommend. Low's Champion is a good one.

TOMATOES.

Fifty varieties of tomatoes were under test this season. The plants were started in the hot-bed April 1; transplanted to strawberry boxes, one plant to a box, April 13. These were planted in the open ground May 12, in rows 4 feet apart, and the plants 4 feet apart in the rows. Eight plants of each variety were planted.

The soil on which these were grown was used last year for cabbage, and was in a fair state of fertility. It was a light loam, rather deficient in humus. Bone meal and complete fertilizer mixed in equal parts was sown at the rate of 500 lbs. per acre broadcast, and harrowed in before the plants were put out.

The variety Spark's Earliana still continues to be the best sort for these provinces. Owing to a late spring and early fall frosts the season here for tomatoes is practically limited to 3 months—from June 15 to September 15—hence only the earliest ripening tomatoes are suitable for profitable planting. Spark's Earliana is the best smooth early variety yet tried. It has good size, and although the fruit is not as regular and smooth as it was when first introduced, yet it is better here in this respect than any of the other early kinds tried.

A very satisfactory method to follow in order to keep good, smooth stock of any variety is to select seed from the plants that produce regular smooth, early ripening fruit. Some of the most successful growers obtain the bulk of their seed by following this method.

The variety Tenderloin and Livingston's Globe are two sorts tested this season for the first time. Neither of these, judging from one season's test, are of any value for the maritime provinces. The former is a rough, late sort, and the latter large and smooth, but very late, and quite subject to rot. The variety Dominion Day, about a week later than Earliana but very prolific, has with us grown very rough fruit. The Chalk's Early Jewel has been under test for 3 years. It is a good, smooth tomato, fully 8 days later than Earliana, and much more liable to rot. We have found that seed of Earliana does not germinate as easily as most other sorts, hence more care is necessary in starting this variety.

Experiments were conducted with Spark's Earliana to ascertain to what extent pinching off the top of the plant when about 5 inches high would increase the production of early fruit. By so doing side branches are started and instead of having a plant with only one stalk, 4 or 5 stalks are obtained, and instead of having only one flower cluster, several branches are had with flower clusters just as far advanced. This is a question of special importance in these provinces where at best the ripening of the fruit is very difficult.

Thirty-four plants of Earliana were pinched off May 10, and thirty-four others were left to grow up as a single stalk. These were started from seed sown April 1, and planted in strawberry boxes, one plant to a box, April 18.

The plants were put in the open ground June 12, by simply cutting the boxes and setting the plants without disturbing the earth at the roots. The vines were grown without stakes. The soil was a light loam. Complete fertilizer and bone meal mixed half and half was used by spreading broadcast around the places where the plants were to occupy, and digging it in well before planting. This was used at the rate of 1,000 lbs. per acre. The plants were set in rows 4 feet apart and 4 feet apart in the rows. Each plot was 1/82.5 of an acre, or two rows 66 feet long and 4 feet wide. The crop obtained from this area is given in the following table. The yield per acre is calculated from the quantity obtained from these plots:—

Variety Earliana.	Ripe Fruit Picked.						Green fruit picked Sept. 25th.	Total ripe fruit per plot.	Total yield of ripe fruit per acre.	Total yield of green fruit per acre.	Total yield per acre.
	Aug. 25th.	Aug. 30th.	Sept. 2nd.	Sept. 9th.	Sept. 15th.	Sept. 25th.					
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Bu. Lbs.	Bu. Lbs.	Bu. Lbs.
Pinched Back......	6½	12¼	30¾	79¼	129	94¾	163¾	517¼	711 12	225 9	936 21
Not Pinched Back.	1	6	20¼	47¾	97½	101¾	226	518¼	712 35	310 45	1,023 20

ONIONS.

Five of the leading sorts of onions were tested this season. The ground on which they were grown was a light clay loam in a fairly good state of fertility, having been in onions the previous year. The ground was well worked up with the land grubber to a depth of six inches. Wood ashes at the rate of 1,000 lbs. per acre and complete fertilizer at the rate of 500 lbs. per acre were sown broadcast and harrowed in with the smoothing harrow. The plants were planted on the level ground in rows one foot apart and about 3 inches apart in the rows.

The seed was started in the hot-bed April 5, in boxes having about six inches of soil. The plants were transplanted from these boxes to the open ground May 25. Seed is better sown the third week in March, so that the plants will be in good condition for transplanting about the middle of May. It requires from 7 to 8 weeks to develop good plants. This season being exceptionally dry the plants did not make as good growth as usual.

The crop was pulled October 4, and the yield per acre is calculated from the weight obtained from one row 66 feet long.

EXPERIMENTS WITH ONIONS.

Variety.	Yield per Plot.	Yield per Acre.	Remarks.
	Lbs.	Bush.	
Golden Globe	56	616	Matured good.
Australian Brown	50	550	" "
Australian Yellow Globe	65	715	" "
Prizetaker	70	770	Matured fair.
Large Red Wethersfield	70	770	" "

EARLY POTATOES.

Eight varieties of early potatoes were planted on a light loam. The ground was manured at the rate of 30 one-horse cart loads of stable manure per acre the previous fall. This was worked up in the spring and rows were made 2½ feet apart and about 4 inches deep with the double mouldboard plough. The seed was planted one foot apart in the rows and covered about 4 inches deep. The ground was later harrowed over once, and after being cultivated several times between the rows the plants, when six inches high, were hilled up by using the double mouldboard plough.

The object of this experiment was to determine which variety would produce the largest quantity of marketable tubers for the early market. The seed was planted May 18, and the first digging was on August 5, and the second on August 18. The Irish Cobbler again produced the largest quantity of marketable tubers. The Early Andes deserves special mention for its quality. The following table gives the yield per acre from these plots. Each plot was one row 66 feet long:—

EXPERIMENTS WITH EARLY POTATOES.

—	Dug August 5.				Dug August 18.			
	Marketable.		Not Marketable.		Marketable.		Not Marketable.	
	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.
Early Michigan	176	..	53	54	303	36	38	30
Early Andes	144	40	38	30	248	36	22	..
Bovee	110	..	75	54	268	24	33	..
Early Envoy	107	14	72	36	303	36	24	12
Pearces Ex. Early	144	40	70	24	299	12	38	30
Early Sunrise	137	30	78	6	248	36	26	24
Rochester Rose	136	24	72	36	253	..	26	24
Irish Cobbler	209	..	53	54	316	48	33	..

LIST OF THE BEST VEGETABLES TO GROW.

From several years' experience in testing many of the different varieties of vegetables now advertised by seed merchants in Canada and the United States, the following may be recommended as equal to any of those so far tested here:—

Pease, Tall.—Extra early: Surprise. Early: Thomas Laxton. Medium: Admiral Dewey. Late: Telephone. Dwarf. Extra early: Early Excelsior. Early: Nott's Excelsior. Medium: Rivenhall Wonder. Late: Juno.

Tomatoes.—Sparks' Earliana.

Beans.—Green Pod. Early: Bountiful and Lightning. Late: Refugee or 1000 to 1. Golden Pod: Market Wax and Valentine Wax.

Corn.—Extra early: Extra Early Beverly. Early: Extra Early Cory and Premo. Medium: Crosby's Early.

Cucumbers.—White Spine.

Squash.—Autumn: Boston Marrow and Golden Hubbard. Late: Hubbard.

Parsnips.—Hollow Crown and Improved Half Long.

Carrots.—Chantenay

Onions.—Prizetaker and Australian Brown.

Lettuce.—Curled: Black Seeded Simpson. Cabbage: Improved Salamander.

Cabbage.—Extra early: Paris Market. Early: Jersey Wakefield. Medium: Early Spring and Succession. Late: Late Flat Dutch. Red: Mammoth Rock Red.

Celery.—Paris Golden Yellow Self-blanching, Improved White Plume and Perfection Heartswell.

Cauliflower.—Early Erfurt.

Beets.—Extra early: Egyptian Turnip. Early: Eclipse.

Spinach.—Victoria.

Salsify.—Sandwich Island.

Radishes.—French Breakfast and Icicle. Winter: Scarlet China.

Parsley.—Double Curled.

Citron Melon.—Colorado Mammoth.

Water Melons.—Cole's Early.

Egg Plant.—New York Improved Purple.

Brussels Sprouts.—Improved Dwarf.

Kale.—Dwarf Green Curled.

Asparagus.—Conover's Colossal and Argenteuil.

Rhubarb.—Linnæus and Victoria.

Turnips.—Golden Ball and Selected Purple Top Swede.

I have the honour to be, sir,
Your obedient servant,

W. S. BLAIR,
Horticulturist.

EXPERIMENTAL FARM FOR MANITOBA

REPORT OF S. A. BEDFORD, SUPERINTENDENT.

Brandon, Man., November 30, 1905.

To Dr. Wm. Saunders, C.M.G.,
Director, Dominion Experimental Farms,
Ottawa.

Sir,—I have the honour to submit, herewith, my eighteenth annual report with details of experiments undertaken and work accomplished on the Experimental Farm for the province of Manitoba.

The past winter was a very pleasant one, with abundance of sunshine and very little snow.

The month of March was unusually mild and free from storms of all kinds. Several wild plants were in bloom on the 31st. The first seeding of grain was done on the 31st of that month, about ten days earlier than the average. The soil at this date was in excellent condition for seeding.

April was unusually dry and favourable for seeding, and nearly all the wheat was sown under the very best of conditions by the close of the month.

The rainfall during May and June was excessive, and in the Red river valley much of the young grain was seriously injured, but on this farm and in Western Manitoba generally no damage ensued.

The month of July was unusually favourable for all kinds of farm produce, and growth was very rank, so much so on this farm that a very large proportion of the grain was badly lodged, and at one time it threatened to be an unusually late harvest, but towards the end of August the temperature increased and grain of all kinds matured very rapidly.

During harvest the weather was quite favourable, there was no killing frost until September 11, when the thermometer indicated 5 degrees of frost. The crops were then all saved, hence there was no injury from this cause.

The yield of all kinds of grain was above the average, and the province rejoices in one of the most abundant harvests in its history.

On the Experimental Farm nearly all kinds of grain, roots and fodder plants gave unusually large returns.

EXPERIMENTS WITH SPRING WHEAT.

Owing to the abundant rainfall during June and July, spring wheat on summer-fallow lodged badly, and at one time it was feared that serious injury would again result from rust, but fortunately conditions were more favourable during August, 1905, and very little injury resulted from this cause. For some reason nearly all the spring wheat grown in Western Canada this year is light in colour, and very little of it grades No. 1 hard. On this farm nearly all of the wheat grades No. 1 northern, and the kernels are plump and well matured.

A feature of this year's crop was the excellent quality of the straw of Preston wheat. This was quite evident both in the small plots as well as in the larger fields.

Both Red and White Fife were badly lodged, but Preston stood up fairly well, and no doubt this fact accounts largely for the better returns obtained from the latter variety.

In many parts of this province the injury from smut in wheat has been greater this year than usual, and much loss has resulted. On this Farm all seed grain is treated with either bluestone or formalin, and there has been no injury whatever from this cause. Where the wheat has been treated and smut appears it is evident, either that the proper proportion of the drug has not been used or the work has been done carelessly.

Thirty varieties of spring wheat were sown this season on April 10 and 12, side by side, on black loam fallowed, the plots being one-twentieth of an acre each.

WHEAT—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.		Weight per Bushel.	Rusted.
				In.		In.		Lbs.	Bush.	Lbs.	Lbs	
1	Preston	Aug. 25	136	54	Stiff	3¾	Bearded	5,480	52	..	60	Considerably.
2	Laurel	" 21	138	54	"	4	Bald	7,260	47	40	58½	Slightly.
3	White Fife	" 29	141	51	Fair	3½	"	5,960	47	20	56½	Considerably.
4	Huron	" 25	136	54	"	4	Bearded	6,480	47	..	60½	"
5	Advance	" 27	138	51	Stiff	3½	"	5,600	46	40	60¾	Slightly.
6	Red Fife	" 29	141	49	Fair	3½	Bald	3,680	45	20	60¼	Considerably.
7	Wellman's Fife	" 30	142	57	"	4	"	6,800	45	..	58½	"
8	Haynes' Blue Stem	" 30	141	54	....	4	"	6,120	44	40	61½	Slightly.
9	Power's Fife	" 28	139	52	Fair	3½	"	6,760	44	..	60	"
10	Minnesota No. 163	" 30	141	53	"	4	"	6,980	43	40	59	"
11	Percy	" 26	137	53	Stiff	4	"	6,100	43	20	57	Considerably.
12	Riga	" 23	134	47	Weak	3½	"	5,640	42	40	57	Slightly.
13	Bishop	" 18	129	48	Fair	3½	"	5,480	42	..	55¼	"
14	Stanley	" 25	136	53	Stiff	4	"	5,780	42	..	59	"
15	Pringle's Champlain	" 25	136	47	Weak	4	Bearded	5,700	41	40	61	Considerably.
16	Dawn	" 25	136	53	"	3¾	Bald	6,100	41	40	57	"
17	Monarch	" 30	142	50	"	4	"	6,800	41	..	60½	Slightly.
18	Australian No. 9	" 28	140	50	"	4	"	7,340	41	..	60	Considerably.
19	Herisson Bearded	" 29	139	47	"	4	Bearded	5,340	41	..	58¼	Badly.
20	Downy Riga	" 17	128	47	"	3	Bald	4,900	40	..	56	Slightly.
21	McKendry's Fife	" 30	142	52	"	4	"	6,200	40	..	60	Badly.
22	Chester	" 25	136	54	"	4	"	6,560	39	..	58½	Slightly.
23	White Russian	" 29	141	48	"	4	"	7,360	39	..	55½	Considerably.
24	Hungarian White	" 27	138	52	"	4½	Bearded	5,400	38	20	57	Badly.
25	Early Riga	" 19	130	52	"	3½	Bald	5,000	38	..	58	Slightly.
26	Colorado	" 27	137	52	Stiff	3½	Bearded	5,400	36	40	58	Considerably.
27	Weldon	" 28	140	48	Weak	4	Bald	6,440	36	..	57	Slightly.
28	Countess	" 25	137	53	"	3½	"	4,640	36	..	60½	"
29	Clyde	" 26	138	51	Fair	4	"	5,640	34	20	55	"
30	Red Fern	" 26	136	50	"	3½	Bearded	4,600	33	20	60	Considerably.

EXPERIMENTS WITH MACARONI WHEAT.

As rust was not as prevalent as usual this year Macaroni wheat gave only a slight increase in yield over the ordinary wheats. It is unsaleable for milling purposes in this country, and for that reason we do not recommend it for general cultivation.

The size of the plots for this test was one-twentieth of an acre, the soil a black loam, summer-fallowed. All were sown on April 12.

MACARONI WHEATS—TEST OF VARIETIES.

Name of Variety.	Date of ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.		Weight per Bushel.	Rusted.
			In.		In.		Lbs.	Bush.	Lbs.	Lbs	
Yellow Gharnovka	Aug. 29	139	51	Weak..	2½	Bearded..	6,280	54	..	59½	None.
Roumanian	Sept. 4	145	54	" ..	3	" ..	5,700	50	..	62	"
Goose	" 5	146	54	" ..	3½	" ..	5,600	49	..	62	"
Mahmoudi	" 3	144	46	" ..	3	" ..	4,000	46	40	60	Slightly.

EXPERIMENTS WITH EMMER AND SPELT.

The plots used for this test were one-twentieth of an acre each. The soil a black loam summer-fallowed. All were sown on April 12.

EMMER AND SPELT—TEST OF VARIETIES.

Name of Variety.	Date of ripening.	No. of Days Maturing.	Length of Straw	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.	Weight per Bushel.	Rusted.
			In.		In.		Lbs.	Lbs.	Lbs	
Common Emmer	Aug. 27	137	47	Weak..	2½	Bearded..	6,760	2,840	45	None.
Red Emmer	Sept. 4	145	54	" ..	4	" ..	6,300	2,500	41	"
Red Spelt	Aug. 29	139	51	Stiff....	3½	Bald.....	3,600	3,500	31	"
White Spelt	Sept. 1	142	49	" ..	5	"	4,320	2,280	27	Badly.

A TEST OF FERTILIZERS FOR THE GROWING OF WHEAT.

The soil used for this test was a light loam cropped for many years without fertilizer of any kind. Judging from this year's test, such soils are benefited by the use of chemical fertilizers.

The size of the plots was one-fortieth of an acre each. All were sown on summer-fallowed land on May 5 and harvested on September 1. There was no smut and very little rust. The grain was very badly lodged on all the plots. The variety of wheat sown on these plots was Red Fife.

—	Length of Straw.	Length of Head.	Weight of Straw per Acre.	Yield per Acre.		Weight per Bushel.
	Inches.	Inches.	Lbs.	Bush.	Lbs.	Lbs.
100 lbs. per acre of nitrate of soda, half sprinkled when the grain was 2 in. high, balance when 6 in. high	53	3½	8,800	46	..	59
200 lbs. per acre of nitrate of soda, half sprinkled when the grain was 2 in. high, balance when 6 in. high	53	3½	8,400	43	20	58½
No fertilizer used	53	3½	8,000	38	40	58½
Superphosphate, 400 lbs. per acre, spread just before sowing	53	3½	8,400	42	40	58½
Muriate of potash, 200 lbs. per acre, spread just before sowing	53	3½	8,400	46	46	59
A mixture of 200 lbs. superphosphate, 100 lbs. of nitrate of soda, 100 lbs. muriate of potash, per acre, half spread before sowing, half when 2 or 3 inches high	53	3½	9,200	55	21	59

DIFFERENT PREPARATIONS FOR A WHEAT CROP.

(All on Plots of 1-20th acre.)

Preparation.	Rusted.	Sown.	Ripe.	Weight of Straw.	Yield per Acre.	
				Lbs.	Bush.	Lbs.
Wheat after peas	None	May 29	Aug. 23	5,140	52	40
" " roots	"	" 29	" 24	5,080	48	40
" " wheat	"	" 29	" 30	5,100	45	00
" " corn	"	" 29	" 28	4,540	44	20
" " flax	"	" 29	" 23	3,580	43	00
" on summer fallow	Badly	" 29	" 30	4,780	37	00
" sown with shoe drill		April 24	" 30	6,600	40	00
" " disc drill		" 24	– 30	6,300	38	20
" sown 1½ inches deep		" 12	" 30	6,500	45	00
" " 3 "		" 12	" 30	6,080	42	00

FIELD PLOTS OF WHEAT.

Variety.	Character of Soil.	Size of Field	Sown.	Ripe.	Weight per bushel.	Yield per Acre.	
					Lbs.	Bush.	Lbs.
Preston	Clay loam	10 acres.	April 4	Aug. 21	63	48	12
"	"	6 "	" 4	" 21	63	36	20
Red Fife	"	8 "	" 12	" 30	62	40	45
"	"	11 "	" 12	" 30	62	36	45
Pringle's Champlain	"	5 "	" 7	" 20	63	38	48
Laurel	"	5 "	" 4	" 22	60	37	10

PREVENTIVES OF SMUT IN WHEAT.

As mentioned elsewhere there has been an unfortunate increase throughout the Canadian North-west in the amount of smut in wheat. Only 3 per cent of the 1904 crop was rejected for this cause by the inspectors at Winnipeg, but out of a total of 16,603 cars inspected up to November 1 of this year, 994 or 6 per cent have been rejected. This represents an immense loss to the farmers of this country, nearly all of which could have been avoided by the proper use of such smut preventives as bluestone and formalin.

From information gathered at farmers' meetings I judge that sufficient care is not exercised in the preparation and application of bluestone. Some farmers use cold water to dissolve the drug and do not give it sufficient time to make a complete solution, others fail to thoroughly stir the grain during the time the liquid is applied and a proportion is not moistened.

After formalin has been applied to the grain the heap should be well stirred, then covered with canvas or old bags so as to keep in the fumes.

From the accompanying table it will be noticed that both formalin and bluestone were effectual in preventing smut, whether applied by steeping or sprinkling and in addition the treated seed gave a larger yield in every instance. This agrees with our experience here in former years and I am strongly of the opinion that smut in wheat can always be prevented by the proper use of bluestone or of formalin.

The seed used for this test was very smutty Red Fife; the size of the plots was one-fortieth acre, the soil a sandy loam summer-fallowed. All were sown on April 25 and harvested on September 29.

How Treated.	Good heads in 9 sq. ft.	Smut heads in 9 sq. ft.	Yield per Acre.	
			Bush.	Lbs.
Smutty wheat sprinkled with 9 oz. of formalin to 10 galls. of water........	428	00	38	00
Smutty wheat steeped 5 minutes in 4½ oz. of formalin to 10 galls. of water.	382	00	37	00
Smutty wheat sprinkled with 1 lb. of bluestone to 1 pail of water.........	506	00	35	20
Smutty wheat steeped 5 minutes in ½ lb. bluestone to 1 pail of water....	522	00	35	00
Smutty wheat not treated..	430	61	33	20

A TEST OF SELECTED AND UNSELECTED SEED.

During the past year Dr. Charles Saunders, Cerealist of the Dominion Experimental Farms, made a careful selection of seed from a number of varieties of wheat, with the object of eliminating the yellow skinned kernels and bringing the sample up to a uniform grade and colour. A portion of the grain was sown here in one-twentieth acre plots and adjoining plots of the same size were sown with unselected grain of the same varieties. From the accompanying tables it will be noticed that the selected grain gave the best returns in every instance:—

	Bush.	Lbs.
Preston, selected by Dr. C. Saunders..................	52	
" unselected, Brandon Experimental Farm......	50	20
Percy, selected..................................	43	20
" unselected................................	35	20
Stanley, selected................................	42	
" unselected................................	37	20
Laurel, selected................................	47	40
" unselected................................	43	40
White Fife, selected............................	47	20
" unselected............................	38	20
Downy Riga, selected............................	40	
Riga, selected..................................	42	40
Early Riga, unselected..........................	38	

NOTE.—Both the Riga and the Downy Riga were selections from the Early Riga.

ROTATION OF CROPS.

In the spring of 1899 arrangements were made for a series of rotation plots, the principal object being the maintenance of the fertility of the soil by the ploughing under of a leguminous crop every third year instead of the usual summer-fallow.

As the first field selected for this purpose was flooded in 1902 and 1904, it was considered unsuitable, and a new location was selected this year.

The Red Clover was sown at the rate of 12 pounds per acre and mixed clovers in the proportion of 8 pounds of Alfalfa and 6 pounds of Alsike per acre. These leguminous plants were ploughed under when they reached their fullest development.

The order of rotation is as follows:—

	1905.	1906.	1907.
1.	Pease	Wheat	Wheat.
2.	Tares	Wheat	Oats.
3.	Red Clover	Wheat	Wheat.
4.	Alfalfa and Alsike	Wheat	Barley.
5.	Wheat	Wheat	Pease.
6.	Wheat	Oats	Tares.
7.	Wheat	Wheat	Red Clover.
8.	Wheat	Barley	Alfalfa and Alsike.
9.	Wheat	Pease	Wheat.
10.	Oats	Tares	Wheat.
11.	Wheat	Red Clover	Wheat.
12.	Barley	Alfalfa and Alsike	Wheat.
13.	Wheat	Wheat	Summer-fallow.
14.	Wheat	Oats	Summer-fallow.
15.	Wheat	Barley	Summer-fallow.
16.	Wheat	Wheat	Oats.
17.	Wheat	Barley	Oats.

RESULTS OF FIRST YEAR, 1905, ROTATION TESTS.

Name of Variety.	Sown.	Ripe.	Days Maturing.	Length of Straw.	Yield per Acre.		Weight per bushel.
				Inches.	Bush.	Lbs.	Lbs
Pease	May 6	Plowed under Aug. 6		48			
Tares	" 6	" " " 6		34			
Red Clover	" 26	" " Sept. 15		26			
Alfalfa and Alsike	" 26	" " " 15		41			
Wheat	" 6	Sept. 1	118	51	35	50	57
Wheat	" 6	" 1	118	51	36	20	57
Wheat	" 6	" 1	118	51	35	00	57
Wheat	" 6	" 1	118	51	33	00	57
Wheat	" 6	" 1	118	51	33	30	57
Oats	" 6	Aug. 29	115	55	105	00	34
Wheat	" 6	Sept. 1	118	52	35	20	58
Barley	" 16	Aug. 27	103	42	40	10	49
Wheat	" 6	Sept. 1	118	54	35	40	58
Wheat	" 6	" 1	118	54	35	10	58
Wheat	" 6	" 1	118	52	38	10	58
Wheat	" 6	" 1	118	50	35	10	58
Wheat	" 6	" 1	118	52	35	50	58

NOTE.—The varieties of grain used in this test were Red Fife wheat, Banner oats, Mensury barley and Pride pease. The size of the plots was one-tenth acre each.

EXPERIMENTS WITH OATS.

Forty-one varieties of oats were tested this year, the crop was a very heavy one. Although nearly every variety was badly lodged early in the season the kernels filled out well and the yield was the largest in the history of this farm. Numerous complaints are heard this year of loss from smut in oats. After several years' trial we have found that smut in this grain can be eradicated by the proper use of formalin.

Since this remedy has been used we have rarely seen a smutty head of oats on the farm.

The Daubeney oat was tried this year for the first time; it is extremely early and promises to prove very useful on land infested with wild oats; if cut on the very first appearance of the head very few wild oats will have matured, and the immature plants will make excellent fodder either green or cured.

The size of the plots in this test of varieties was one-twentieth acre each. The soil was a rich sandy loam, summer-fallowed. Two bushels of seed per acre was used. All were sown on April 27 and 28.

OATS—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.		Weight per Bushel.	Rusted.
				In.		In.		Lbs.	Bush.	Lbs.	Lbs.	
1	Golden Giant...... ..	Aug. 31	125	51	Fair......	11	Sided..	5,900	135	10	34	Consid'ably.
2	Improved American..	" 27	122	55	Stiff	9	Branching..	7,240	134	4	40	None.
3	Goldfinder	" 29	123	50	Weak	10	½ sided	5,300	132	12	33½	Slightly.
4	Golden Beauty.....	" 29	123	51	"	9	Branching..	5,760	129	14	36	"
5	Golden Fleece.... ..	" 29	123	53	"	8	" ..	6,640	125	10	37	"
6	Banner..............	" 28	123	55	Stiff	9½	" ..	5,840	122	12	38	"
7	Bavarian	" 29	123	55	"	8½	" ..	5,820	121	26	36	Consid'ably.
8	Abundance	" 26	120	54	"	8	" ..	5,380	121	6	37½	"
9	Pioneer	" 23	117	54	"	9	" ..	5,600	120	20	40	None.
10	Siberian.............	" 29	124	54	Weak	10	" ..	5,660	118	28	36	"
11	Waverley......... . .	" 29	124	56	"	8	" ..	6,060	118	8	37½	Slightly.
12	Golden Tartarian.....	" 30	124	54	"	11	Sided	5,600	117	22	33	None.
13	Wide Awake........	" 29	124	51	Fair......	9	Branching..	2,450	117	22	38	"
14	White Giant	" 26	120	53	"	10	" ..	2,720	117	2	35	Badly.
15	Mennonite	" 26	120	55	"	10	" ..	5,320	111	6	36	"
16	Tartar King	" 23	118	58	Stiff	9	Sided	5,180	115	10	41	None.
17	Black Beauty........	" 23	117	50	Weak	12	Branching..	3,920	114	4	36	"
18	Scotch Potato	" 29	123	56	....	9½	" ..	6,620	114	4	36	Slightly.
19	Holstein Prolific.. ..	" 27	121	56	....	9	" ..	4,420	114	4	36½	Consid'ably.
20	American Triumph ..	" 30	125	54	Weak	9	" ..	2,420	113	18	37	None.
21	Early Golden Prolific	" 28	122	54	"	9	" ..	5,060	112	32	37	Slightly.
22	Irish Victor.........	" 28	123	59	Fair......	5	" ..	6,600	112	32	37	None.
23	Buckbee's Illinois ...	" 27	122	54	Stiff	9	" ..	6,500	111	26	38	"
24	American Beauty....	" 26	120	54	Weak	10	" ..	5,380	110	..	35	Badly.
25	Lincoln...............	" 26	121	53	Fair......	11	" ..	5,860	108	28	35	"
26	Kendal White........	" 26	120	54	"	10	Sided.	5,140	107	22	35	"
27	Joanette	" 27	121	43	Weak....	9	Branching..	3,960	107	2	35	"
28	Thousand Dollar.....	" 27	122	52	Fair......	8	" ..	4,800	105	30	39	None.
29	Swedish Select	" 27	122	52	"	8	" ..	5,340	104	24	38	"
30	Daubeney...........	" 15	109	47	"	9	" ..	4,760	104	4	38	Slightly.
31	Danish Island........	" 26	121	53	"	10	" ..	5,760	104	4	37	Consid'ably.
32	Columbus...........	" 26	120	53	"	9	" ..	2,390	103	18	35	Badly.
33	Green Russian..	" 24	119	53	"	11	" ..	5,740	100	20	35	Slightly.
34	Sensation	" 28	123	57	"	9	" ..	5,140	98	28	38	None.
35	Improved Ligowo....	" 26	121	56	"	9	" ..	6,180	97	22	36	Badly.
36	Olive Black	" 30	124	54	"	10	" ..	5,780	97	22	35	"
37	Storm King..	" 26	120	53	Stiff	9	Sided.......	2,660	96	16	38½	Slightly.
38	Twentieth Century ..	" 39	124	54	Weak	9	Branching..	5,660	95	10	38½	None.
39	Kendal Black	" 30	124	52	"	10	Sided.......	6,140	92	32	36	Badly.
40	Milford White.......	" 27	121	54	Fair......	9	"	4,820	90	20	36	"
41	Milford Black......	" 30	124	52	Weak	11	"	5,000	82	12	36	"

DIFFERENT methods of preparation for an Oat crop. All on plots of 1/20 acre each.

Preparation.	Sown.	Ripe.	Weight of Straw.	Yield per Acre.	
			Lbs.	Bu.	Lbs.
Oats on summer-fallow	April 29	Aug. 30	4,660	115	30
" after corn	" 29	" 23	6,880	106	16
" " roots	" 29	" 18	6,940	71	06

EXPERIMENTS WITH BARLEY.

Since wild oats have spread so much throughout this province, there is an active demand for an early variety of barley that will ripen before the wild oats shell, and by this means assist in eradicating the weed.

The Common six-rowed variety is one of the best for this purpose as it ripens earlier than any other kind grown by us, except the Champion, a beardless variety, unproductive and inferior in quality.

When barley is used for this purpose it should be cut before maturity, otherwise some of the wild oats will have shelled.

Thirty-four varieties of this grain were grown this year, nineteen of which were six-rowed and fifteen two-rowed. The yield was much above the average, but owing to the grain lodging early in the season, most of it was dark in colour.

Among the six-rowed kinds, the Mensury had the stiffest straw. Mansfield, the variety heading the list for yield, has always proved very productive here. It is a cross-bred variety produced on the Central Experimental Farm. This kind has given the highest average yield here for the past six years.

The size of the plots used for this test was one-twentieth of an acre. The soil was sandy loam, summer-fallowed. All were sown on May 17, in the proportion of two bushels of seed per acre.

SIX-ROWED BARLEY—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Weight of Straw.	Yield per Acre.		Weight per Bush.	Rusted.
				In.		In.	Lbs.	Bush.	Lbs.	Lbs.	
1	Mansfield	Aug. 19	94	39	Fair	3	5,180	77	24	51	Slightly.
2	Mensury	" 17	92	43	Stiff	3	5,880	75	20	49¼	Considerably.
3	Odessa	" 18	93	37	Weak	3	4,520	68	16	51	Slightly.
4	Argyle	" 20	95	37	"	3	5,880	67	04	49¼	"
5	Rennie's Improved	" 15	90	38	"	2½	4.300	66	32	50¼	"
6	Albert	" 17	92	38	"	3¾	4,120	66	12	50½	"
7	Oderbruch	" 16	91	35	"	2½	2,420	65	40	50	"
8	Summit	" 20	95	40	"	3	5,600	64	28	50	Considerably.
9	Stella	" 21	96	37	"	3	5,240	63	36	51	Badly.
10	Yale	" 18	93	43	"	3	4,240	63	36	50¼	Slightly.
11	Blue Long Head	" 23	98	35	Fair	3½	2,640	62	44	42½	Badly.
12	Brome	" 17	92	37	Weak	3½	4,680	62	04	52	Slightly.
13	Nugent	" 17	92	41	"	2½	4,700	60	20	49	"
14	Common	" 15	90	41	"	2½	3,920	60	..	49	"
15	Claude	" 16	91	35	"	2¼	4,900	58	16	49	"
16	Empire	" 19	94	36	"	3	5,020	55	40	51	Badly.
17	Trooper	" 20	95	32	"	2	5,440	53	16	49½	Considerably.
18	Royal	" 17	92	39	"	3	3,000	50	..	49	Slightly.
19	Champion	" 15	90	43	Fair	3½	5,340	42	44	44	"

Two-rowed Barley—Test of Varieties.

Number.	Name of Variety.	Date of Ripening.		No. of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Weight of Straw.	Yield per Acre.		Weight per Bush.	Rusted.
					In.		In.	Lbs.	Bush.	Lbs.	Lbs.	
1	Gordon	Aug.	22	97	44	Stiff	3	5,640	67	44	50¼	None.
2	Jarvis	"	22	97	44	"	4½	8,200	63	36	50	"
3	Harvey	"	19	94	46	"	4	6,260	63	16	50	Slightly.
4	French Chevalier	"	23	98	42	Weak	4	5,380	62	04	49½	"
5	Danish Chevalier	"	23	98	42	"	4	4,780	60	40	50	"
6	Standwell	"	22	97	44	"	3½	4,340	59	28	50	"
7	Canadian Thorpe	"	23	98	42	Fair	3	4,640	56	32	49	Badly.
8	Beaver	"	22	97	46	"	3½	4,680	54	28	48	Slightly.
9	Clifford	"	23	98	48	Stiff	3½	6,000	54	08	50¼	None.
10	Dunham	"	22	97	49	Weak	3½	4,620	53	36	49	Slightly.
11	Swedish Chevalier	"	25	100	41	Fair	4	6,920	53	36	52	"
12	Invincible	"	22	97	47	Weak	3	4,920	53	36	49	"
13	Newton	"	23	98	44	"	4	3,700	53	16	50½	"
14	Logan	"	22	97	44	Fair	4	5,760	52	44	49½	"
15	Sidney	"	22	97	44	"	4	5,980	48	16	50½	Badly.

Different Methods of Preparation for a Barley Crop.

Preparation.	Sown.		Ripe.		Weight of Straw per Acre.	Yield per Acre.	
					Lbs.	Bush.	Lbs.
Barley after roots	May	16	Aug.	18	4,380	71	12
Barley after corn	"	16	"	18	4,380	65	..
Barley on summer-fallow	"	16	"	19	4,500	58	16

EXPERIMENTS WITH PEASE.

Owing to the attacks of Cutworms, the yield of pease on the uniform plots was slightly below the average, but the quality and weight were excellent. As a rule the pea crops on this farm do not suffer from the attacks of Cutworms, but last fall the land set apart for pease was flooded and a considerable quantity of stubble and other rubbish collected on it. This evidently proved good winter protection for the young Cutworms, and they commenced their destructive work just as soon as the pease appeared above the ground.

For the first time a trial was made of sowing pease with the newly introduced double disc drill. The seed was distributed more evenly than with either the Shoe or Hoe drill, and it was possible to plant the seed four inches deep even in hard summer-fallow, with the result that germination was remarkably even and vigorous.

In addition to the uniform plots of pease several acres of field pease were grown. These larger fields were free from rubbish in the fall, and the crop was not in the least injured by Cutworms.

The small plots were cut with a scythe, but the pea harvester attached to a mower was used for cutting the larger fields. When the pease were ripe and the straw perfectly dry, the harvester worked very satisfactorily.

The bulk plots of pease were threshed with the regular grain separator, but many of the pease were cracked, and I would not recommend this plan when the grain is wanted for seed purposes.

Thirty varieties of pease were on trial this year. The soil was a clay loam summer-fallowed. The size of the plots was one-twentieth acre. All were sown on April 19 and 20, in the proportion of two bushels of seed per acre for the small kinds, and three bushels for the larger pease.

PEASE—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Length of Pod.	Size of Pea.	Yield per Acre.		Weight per Bushel.
				In.	In.		Bus.	Lbs.	Lbs.
1	Early Britain	Sept. 10	144	54	3	Large	51	40	62
2	Mackay	" 16	150	64	2½	Medium	45	40	62½
3	Prince	" 18	152	70	3	"	45	..	61½
4	White Wonder	" 10	143	56	2¼	Small	44	20	63
5	Gregory	" 17	151	64	3	Large	44	..	64½
6	Prussian Blue	" 6	139	67	2½	Medium	42	..	60½
7	Wisconsin Blue	" 11	144	63	3	"	41	40	64½
8	Chancellor	Aug. 30	132	52	2	Small	41	40	64
9	English Gray	Sept. 8	142	52	2½	Medium	41	20	61½
10	Golden Vine	" 9	142	55	2	Small	40	40	63
11	Arthur	" 12	145	54	2½	"	40	20	64
12	Pearl	" 19	153	54	......	Medium	40	20	63
13	German White	" 10	143	64	2½	"	40	..	65
14	Mummy	" 11	144	54	2	Small	38	40	64½
15	Black Eye Marrowfat	" 9	143	52	4	Large	38	20	62½
16	Kent	" 18	152	82	3	"	38	..	61
17	White Marrowfat	" 7	141	52	4	"	38	..	63
18	Duke	" 20	153	74	3½	"	37	40	62½
19	Picton	" 6	139	65	2¼	Small	37	40	63
20	Agnes	" 14	148	74	3	Medium	37	..	62½
21	Paragon	" 12	146	56	2½	"	36	40	63½
22	Victoria	" 10	144	56	3	"	36	20	64½
23	Pride	" 17	150	64	2½	"	36	20	62½
24	Daniel O'Rourke	" 10	143	64	3	Small	35	40	63
25	Prince Albert	" 20	153	53	2½	"	33	20	63½
26	Carleton	" 19	152	58	2½	Medium	30	40	64
27	Archer	" 19	152	68	2½	"	31	20	64
28	Nelson	" 7	141	54	2	"	31	..	62½
29	Crown	" 6	139	54	2	Small	29	20	64
30	Macoun	" 8	142	67	3	Large	29	50	63½

DIFFERENT METHODS OF PREPARATION FOR A PEA CROP.

ALL ON PLOTS $\frac{1}{20}$ ACRE.

Preparation.	Sown.	Ripe.	Yield per Acre.	
			Bus.	Lbs.
Peas on summer-fallow	April 29	Sept. 3	44	40
" after flax	" 29	" 3	43	..
" " corn	" 29	" 3	42	20
" " roots	" 29	" 3	40	..

PEASE AND OATS MIXED.

Proportion of seed used.	——	Yield per Acre lbs.
Banner oats, 2 pecks Pride peas, 8 pecks per acre..	Sown April 27, Harvested Sept. 1......	3,960
" " 3 " " " 8 " " " ..	" 1......	3,820
" " 1 " " " 8 " " " ..	" 1......	3,600

EXPERIMENTS WITH FLAX.

The abundant rainfall of the past season has been favourable for flax, and the yield of both grain and straw is above the average.

The soil selected for this test was a rich black loam, summer-fallowed. These plots were all one-fortieth acre each, and the seed was sown in the proportion of 40 lbs. per acre.

FLAX—TEST OF VARIETIES.

Varieties.	Date of Sowing.	Date of Ripening.	Length of Straw.	Weight of Straw.	Yield per Acre.		Weight per Bushel.
			Inches.	Lbs.	Bus.	Lbs.	Lbs.
Russian................................	May 21..	Sept. 1..	29	2,600	30	40	55
Improved Russian.........................	" 21..	" 4..	39	3,440	30	..	55
St. Petersburg	" 21..	" 4..	34	4,680	29	36	55¼
Novarossick	" 21..	" 2..	29	2,440	29	16	55
La Plata................................	" 21..	" 9..	32	2,640	27	48	55
Common	" 21..	" 4..	35	3,720	27	8	55½
Bombay	" 21..	" 1..	39	3,440	25	40	54½
White Flowering.........................	" 21..	" 9..	26	2,720	24	16	55½
Yellow Seeded...........................	" 21..	Aug. 29..	31	3,520	20	40	54
Riga	" 21..	Sept. 1..	31	2,360	20	..	55

MIXED GRAIN CROPS.

Proportion of Seed used.	Sown.	Harvested.	Yield per Acre.
			Lbs.
Goose wheat ⅓, Banner oats ⅓, Mensury barley ⅓	April 27....	Sept. 1.....	3,540
" ⅓, " ⅓, Pride pease ⅓.....................	" 27....	" 1.....	3,460
Mensury barley ⅓, Banner oats ⅓, Pride pease ⅓	" 27....	" 1.....	3,620

THE SALE OF SEED GRAIN TO FARMERS.

For many years past much of the surplus grain on this farm has been sold to settlers in Manitoba for seed purposes. Wishing to know how this grain compared with that usually grown by farmers, and whether the product from it was still being used for seed purposes, a circular containing the following questions was sent out to as many of the purchasers as possible:—

1. How did the grain compare with that usually sown by you?
2. Was it productive?
3. Have you disposed of any grain, produced from it for seed purposes?
4. Have you taken any prizes at the fairs with it?
5. Do you still use the product of this grain for seed purposes?
6. If so, is it still of good quality?
7. Have you any suggestions to make regarding the sale of seed grain by the Experimental Farm?
8. Remarks.

Eighty-two replies were received, of these 75 were favourable, and only 7 unfavourable, the following are extracts from a few of the replies received:—

The Red Fife wheat I purchased from your Farm in 1898 was practically pure, therefore better than my own, and it is still the best wheat around here. I can count eleven, at least, who have been supplied with seed from the product of this lot of wheat. Your institution is proving very useful in supplying seed grain.

Wm. Guild, Kemnay, Man.

I procured four bushels of splendid Red Fife wheat from you in 1899 and I consider it as good to-day as when I got it from you. I have supplied a number of others with seed, and took the first prize at the fall fair this year. I consider the Experimental Farm the best place to secure pure seed grain.

A. West, Plumas, Man.

I consider it of great value to the country that reliable seed can be purchased at the Experimental Farm.

D. W. McCuaig,
Pres. Grain Growers' Assoc., Portage la Prairie, Man.

I am much pleased with the seed grain I have purchased from the Experimental Farm, and I have gained many prizes both in the old country and America with grain grown from the seed you supplied me.

Wm. Stevens, Virden, Man.

The five bushels of Banner oats I purchased from the Experimental Farm in 1899 was superior to any I ever had, it was very productive. I have supplied seed from it to farmers living all along the Canadian Pacific Railway between Stockton and Winnipeg. I think it is the only way for farmers of Manitoba to get pure, reliable seed, and I am very grateful to you for your kindness in selling it to me.

J. Caslick, Glenboro, Man.

I got four bushels of Banner oats. They proved to be the best oats I have ever grown. I have supplied seed to a number of my neighbours. I also got six bushels of Red Fife wheat. I am still growing the same wheat and find it all right.

Jas. Milne, Oak Lake, Man.

The two bushels of Banner oats I purchased from your Farm in 1895 was a very much better yielding strain than any I ever had, they gave a return of 880 bushels from ten acres of summer-fallow. I have supplied seed from this lot to farmers all over this district for twenty miles or more.

I got five bushels of Red Fife from you in 1899, it yielded better than any of my own grain. I have disposed of a great deal for seed purposes to other farmers. I have taken both a first and second prize with it at our fair.

W. R. Collis, Shoal Lake, Man.

I obtained 5 bushels of Odessa barley from your farm in 1899, I find it much better than the common barley. I sell all I can spare for seed purposes, 500 bushels were sold for this purpose last year.

D. B. Gunn, Louis Bridge, Man.

I purchased four bushels of Red Fife wheat from your Experimental Farm in 1894 and I think it is the best wheat I ever had. I believe the Experimental Farm is the proper place to buy pure seed.

B. C. Craig, Newdale, Man.

In 1899 I purchased five bushels of Red Fife from the Experimental Farm, it has given the best yield and best sample of any wheat I ever had. I have supplied seed to neighbouring farms every year.

G. H. Underhill, Rapid City, Man.

EXPERIMENTS WITH INDIAN CORN.

This crop was considerably above the average in weight, and the ears were in the late milk stage when cut.

In addition to the plots sown for experimental purposes, about ten acres were sown for ensilage and fodder purposes.

The seed was sown on May 19 in rows 30 inches apart. The crop was cut on September 4. The soil was a sandy loam, summer-fallowed. Twenty-two varieties were sown and the yield per acre has been calculated from the weight obtained from two rows, each 66 feet long.

Corn—Test of Varieties.

Number.	Name of Variety.	Character of Growth.	Height.	Leafiness.	When Tasselled.	Condition when Cut.	Weight per acre grown in rows.		Weight per acre grown in hills.	
			In.				Tons.	Lbs.	Tons.	Lbs.
1	Longfellow	Rank	100	Leafy	Aug. 15	Late milk.	29	80	29	80
2	Angel of Midnight	Fair	112	"	" 12	"	25	1,744	21	240
3	Compton's Early	"	108	Very leafy	" 10	"	25	160	17	320
4	Compton's Early (Canadian seed)	"	110	"	" 10	"	24	48	23	1,520
5	Eureka	V. rank	115	Fairly leafy.	" 18	Early milk	23	1,520	20	920
6	Superior Fodder	Fair	114	"	" 18	"	23	464	19	1,600
7	Pride of the North	Rank	112	Very leafy	" 25	"	23	200	17	1,640
8	Early Butter	"	116	"	" 10	Late milk.	22	1,408	15	1,944
9	North Dakota White	Fair	102	"	" 15	"	22	880	19	280
10	Northern Dent	Rank	118	Fairly leafy.	" 12	"	21	1,560	21	768
11	Salzer's All Gold	"	116	"	" 21	Early milk	21	240	21	504
12	Red Cob Ensilage	Fair	114	"	" 24	In tassel	19	1,600	16	736
13	Thoroughbred White Flint	Rank	106	Very leafy	" 18	Early milk	19	808	18	960
14	Selected Leaming	Fair	104	Few leaves	" 17	"	19	280	14	512
15	King Philip	"	106	Very leafy	" 11	Late milk.	18	960	18	960
16	Early Mastodon	Rank	120	Fairly leafy.	" 11	"	15	1,680	10	1,120
17	Giant Prolific Ensilage	"	118	Few leaves	" 27	In silk	15	1,680	13	400
18	White Cap Yellow Dent	Fair	109	"	" 10	Late milk.	13	1,720	16	1,000
19	Champion White Pearl.	Rank	115	Fairly leafy.	" 21	Early milk	13	1,720	9	1,800
20	Cloud's Early Yellow	Fair	111	Few leaves	" 18	Late milk.	13	1,720	9	1,008
21	Mammoth Cuban	Rank	114	"	" 11	"	11	1,760	9	480
22	Evergreen Sugar	Fair	102	Fairly leafy.	" 17	Early milk	11	1,760	9	1,800

INDIAN CORN SOWN AT DIFFERENT DISTANCES APART.

Name of Variety.	Distance apart.	Height.	Condition when cut.	Weight per Acre, cut green.	
	Inches.	Inches.		Tons.	Lbs.
Champion White Pearl	24	120	Early milk	21	1,560
" "	30	132	"	23	1,520
" "	36	130	"	23	200
" "	42	128	"	21	240
Longfellow	24	103	Late milk	24	840
"	30	103	"	23	992
"	36	104	"	23	1,520
"	42	109	"	26	120
Selected Leaming	24	110	Early milk	17	320
"	30	118	"	26	800
"	36	118	"	26	800
"	42	124	"	27	1,440

Average Yield at different distances apart.	Tons.	Lbs.
Average yield of green corn 24 inches apart	21	240
" " 30 "	24	1,104
" " 36 "	24	840
" " 42 "	24	1,933

EXPERIMENTS WITH FIELD ROOTS.

All kinds of field roots have given above the average yield and the quality is excellent.

As usual two sowings were made of each kind, two weeks intervening between each sowing. Previous to this year all escaped injury from spring frosts and the average gain for five years from early sowing was in the case of turnips, 6 tons 1,515 lbs.; mangels, 2 tons 1,164 lbs.; and carrots, 3 tons 1,090 lbs. per acre.

This year, for the first time, the young mangel seedlings were slightly injured from the two light frosts of June 9 and 21. This did not, however, materially injure the crop and the yields from the early sowings are much the largest.

I am pleased to notice an increased interest taken in the growing of root crops throughout the province. Providing the seeding is done early, large returns can be obtained in nearly all parts of the country with comparatively little labour.

EXPERIMENTS WITH TURNIPS.

Twenty varieties of turnips were grown on the uniform plots this year. The season was a favourable one and the returns large. For the first time in the history of the farm the leaves were attacked by a fungus growth similar to rust. This was first noticed early in July and in a few days the leaves had a very rusty appearance, but with warmer weather it disappeared without apparently injuring the roots.

The soil was a sandy loam fertilized in the fall of 1904 with ten loads per acre of well rotted barnyard manure. The previous crop was mangels.

As usual two sowings were made. In every instance the early sown plots gave the largest returns.

The first plots were sown on May 20, and the second on June 3. The roots from both were pulled on October 4. The estimate of yield has been made from the produce of two rows, each 66 feet long.

TURNIPS—TEST OF VARIETIES.

Number.	Name of Variety.	Yield per Acre. — 1st Plot.		Yield per Acre. — 1st Plot.		Yield per Acre. — 2nd Plot.		Yield per Acre. — 2nd Plot.	
		Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
1	Bangholm Selected	33	792	1,113	12	29	80	968	..
2	Sutton's Champion	30	1,248	1,020	48	17	584	576	24
3	Carter's Elephant	30	984	1,016	24	20	656	677	36
4	Imperial Swede	30	456	1,007	36	26	1,328	888	48
5	New Century	30	192	1,003	12	18	432	607	12
6	Hartley's Bronze	29	1,928	998	48	24	1,896	831	36
7	Good Luck	29	1,400	990	..	24	48	800	48
8	Perfection Swede	29	872	981	12	19	1,864	664	24
9	Elephant's Master	29	344	972	24	22	1,672	761	12
10	Emperor Swede	29	80	968	..	19	1,336	655	36
11	Hall's Westbury	27	1,440	924	..	27	1,176	919	36
12	Halewood's Bronze Top	27	912	915	12	24	1,104	818	24
13	Mammoth Clyde	26	1,328	888	48	22	88	734	48
14	Drummond Purple Top	26	536	875	36	21	768	712	48
15	Magnum Bonum	26	8	866	48	21	1,032	717	12
16	Skirvings	25	1,744	862	24	22	1,672	761	12
17	Jumbo	25	688	844	48	19	808	646	48
18	East Lothian	25	160	836	..	20	1,184	686	24
19	Selected Purple Top	24	48	800	48	21	504	708	24
20	Kangaroo	18	1,224	620	24	16	1,528	558	48

EXPERIMENTS WITH MANGELS.

We find that mangels are relished by nearly all kinds of farm animals, cattle, swine and even chickens eat them readily. Unlike turnips they do not injure the quality of milk and its products.

As mangel seed is large and somewhat slow to germinate, the soil should be mellow and moist and the seed sown from two to three inches deep.

The roots are susceptible to injury from fall frosts, for which reason the crop should be pulled before the weather becomes severe.

Seventeen varieties of mangels have been on trial at the Experimental Farm this year. The yield was above the average and all were saved without injury.

The soil used for this crop was a black loam fertilized in the fall of 1904 with ten loads per acre of well rotted stable manure. The previous crop was turnips. The first sowing was made on May 20 and the second on June 3. All were pulled on October 4.

The estimate of yield has been made from the product of two rows 66 feet long.

MANGELS—TEST OF VARIETIES.

Number.	Name of Variety.	Yield per Acre. — 1st Plot.		Yield per Acre. — 1st Plot.		Yield per Acre. — 2nd Plot.		Yield per Acre. — 2nd Plot.	
		Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
1	Prize Mammoth Long Red	42	744	1,412	24	23	1,520	792	..
2	Ideal	39	144	1,302	24	22	88	734	48
3	Selected Mammoth Long Red	38	1,880	1,298	..	23	992	783	12
4	Mammoth Long Red	38	560	1,276	..	24	840	814	..
5	Yellow Intermediate	37	976	1,249	36	24	48	800	48
6	Prize Winner Yellow Globe	36	192	1,223	12	27	1,440	924	..
7	Lion Yellow Intermediate	35	224	1,170	24	27	384	906	24
8	Half Long Sugar Rosy	34	640	1,144	..	23	464	774	24
9	Gate Post	33	1,848	1,130	48	26	800	880	..
10	Triumph Yellow Globe	33	792	1,113	12	27	1,176	919	36
11	Giant Yellow Globe	33	..	1,100	..	14	512	475	12
12	Selected Yellow Globe	32	944	1,082	24	24	840	814	..
13	Mammoth Yellow Intermediate	31	40	1,034	..	24	312	805	12
14	Giant Yellow Intermediate	30	720	1,012	..	29	80	968	..
15	Half Long Sugar White	30	720	1,012	..	29	872	981	12
16	Leviathan Long Red	29	1,136	985	36	24	312	805	12
17	Giant Sugar	29	80	968	..	25	160	836	..

EXPERIMENTS WITH CARROTS.

More than an average yield of carrots was obtained this year. This root so much relished by horses has given largely increased returns here since we have practised deep ploughing. This appears to encourage a large development of root.

Eleven varieties were tested. The first sowing was made on May 20 and the second on June 3. All were harvested on October 4.

The soil was a black sandy loam, fertilized in the fall of 1904 with ten loads of well rotted manure per acre.

With one exception the early sown plots gave the largest yield. The yield has been calculated from the product of two rows each 66 feet long.

CARROTS—TEST OF VARIETIES.

Number.	Name of Variety.	Yield per Acre. — 1st Plot.		Yield per Acre. — 1st Plot.		Yield per Acre. — 2nd Plot.		Yield per Acre. — 2nd Plot.	
		Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
1	Improved Short White	32	1,120	1,085	20	21	680	711	20
2	Giant White Vosges	31	1,360	1,056	..	22	1,320	755	20
3	Mammoth White Intermediate	27	1,880	931	20	17	320	572	..
4	New White Intermediate	27	120	902	..	23	1,960	799	20
5	Ontario Champion	26	1,240	887	20	21	1,120	718	40
6	Kos Kirches	26	360	872	40	17	1,200	586	40
7	Carter's Orange Giant	25	600	843	20	15	360	506	..
8	Early Gem	23	1,080	784	40	20	920	682	..
9	White Belgian	21	1,560	726	..	20	40	667	20
10	Long Yellow Stump Rooted	19	720	645	20	17	1,640	594	..
11	Half Long Chantenay	10	1,120	352	..	14	1,920	498	40

Common Red Clover, grown at the Experimental Farm, Brandon, Man.

EXPERIMENTS WITH SUGAR BEETS.

Eight varieties of these roots were tested this year, of these only three are recommended for use in the manufacture of sugar, viz., Vilmorin's Improved, Wanzleben and French Very Rich. All the varieties are, however, particularly useful as food for stock. We find young animals relish them better than either mangels or turnips.

The yield on this farm was very much above the average, but the three true sugar beets which were tested by Mr. F. T. Shutt, Chemist of the Dominion Experimental Farms, Ottawa, were not as rich in sugar as usual.

The first plots were sown on May 20 and the second on June 3. The early sown plots gave the largest returns in every instance. All were harvested on October 4.

The estimate of yield has been made from the product of two rows, each 66 feet long. The soil was a black sandy loam fertilized with ten loads of well rotted manure per acre. The previous crop was potatoes.

SUGAR BEETS—TEST OF VARIETIES.

Number.	Name of Variety.	Yield per Acre.—1st Plot.		Yield per Acre.—1st Plot.		Yield per Acre.—2nd Plot.		Yield per Acre.—2nd Plot.	
		Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
1	Red Top Sugar	52	544	1,742	24	27	120	902	..
2	Danish Red Top	46	400	1,540	..	31	40	1,034	..
3	Royal Giant	33	528	1,108	48	25	952	849	12
4	Improved Imperial	33	..	1,100	..	23	1,520	792	..
5	Wanzleben	32	680	1,078	..	18	960	616	..
6	Danish Improved	28	1,024	950	24	26	800	880	..
7	Vilmorin's Improved	24	576	809	36	15	360	506	..
8	French Very Rich	21	240	704	..	16	1,000	550	..

EXPERIMENTS WITH POTATOES.

This useful vegetable has again given a large return. Some of the tubers were not so smooth as usual, but the quality was excellent.

The potatoes followed a crop of field roots; this plan gives an excellent yield with very little labour in weeding.

The soil received a light coat of well rotted barnyard manure in the fall, which was ploughed under and well rolled before winter set in.

Dreer's Standard, the variety heading the list this year, was third in productiveness on this farm in 1904. It is white in colour and of good quality, but it is rather late for this country. Canadian Beauty, the fifth on the list, is much earlier, nearly as productive and the colour is generally more acceptable to Canadian consumers.

As usual the very early kinds were not as productive as the later ones.

Forty-nine varieties were tested this year, there was no injury whatever from rot or from the attacks of the Colorado Beetle.

The soil selected was a sandy loam. All the varieties were planted on May 16 in rows three feet apart and dug on October 2. The yield has been estimated in each case from the product of one row 66 feet long.

Number.	Name of Variety.	Character of Growth.	When Matured.	Average Size.	Total yield per Acre.		Yield per Acre of Marketable.		Yield per Acre of Unmarketable.		Form and Colour.
					Bu.	Lbs.	Bu.	Lbs.	Bu.	Lbs.	
1	Dreer's Standard	V. rank.	Sept. 5.	V. large	887	20	858	..	29	20	White F. oval.
2	American Wonder	"	" 3.	"	799	20	729	40	69	40	" long.
3	Country Gentleman	Fair	Aug. 28.	"	788	20	711	20	77	..	Pink long.
4	Uncle Sam	Rank	Not ripe.	"	762	40	689	20	73	20	White flat.
5	Canadian Beauty	Fair	Sept. 5.	M. to L.	759	00	682	00	77	00	Light pink, long.
6	State of Maine	V. rank.	Not ripe.	V. large	755	20	718	40	36	40	Wh. flat, oval.
7	Sabeans Elephant	"	Aug. 29.	"	744	20	696	40	47	40	White, long.
8	Morgan's Seedling	"	Not ripe.	"	729	40	700	20	29	20	Pink, long.
9	Reeve's Rose	"	Sept. 2.	"	726	00	667	20	58	40	Light pink, oval.
10	Enormous	"	" 3.	Med.	722	20	630	40	91	40	White, round.
11	Moneymaker	Fair	" 1.	Large	718	40	649	00	69	40	" kidney.
12	Empire State	Rank	" 2.	Med.	704	00	638	00	66	00	" long.
13	Holborn Abundance	V. rank.	Not ripe.	Large	700	20	663	40	36	40	" round.
14	Rose No. 9	"	Sept. 11	"	696	40	649	00	47	40	Pink, long, flat.
15	Maule's Thorobred	Fair	" 3.	"	689	20	630	40	58	40	" "
16	Delaware	Rank	" 2.	"	689	20	630	40	58	40	White, long.
17	Pearce	Fair	Aug. 28.	"	685	40	649	00	36	40	Pink, round.
18	Rose No. 9 White	Rank	Sept. 5.	Large	685	40	667	20	18	20	Mixed, round.
19	Early St. George	Fair	Aug. 27.	Med.	678	20	586	40	91	40	Pink, long.
20	Dalmeney Hero	V. rank.	Not ripe.	Large	671	00	638	00	33	00	White, oval.
21	Penn Manor	Fair	Aug. 27.	"	663	40	597	40	66	00	D. pink, long, oval.
22	Burnaby's Seedling	"	" 24.	"	656	20	583	00	73	20	Pink, oval.
23	Swiss Snowflake	V. rank.	Not ripe.	Med.	656	20	623	20	33	00	White, irregular.
24	Late Puritan	"	Sept. 1.	Large	652	40	594	00	58	40	Wh. round, long.
25	American Giant	"	" 1.	M. to L.	638	00	579	20	58	40	Wh. oval.
26	Vermont Gold Coin	"	Not ripe.	V. large	623	20	568	20	55	00	Wh. round.
27	Cambridge Russet	Fair	Sept. 1.	"	605	00	553	40	51	20	Russet, long.
28	Carman No. 3	"	" 5	Med.	605	00	568	20	36	40	Wh. long.
29	Early White Prize	Weak	Aug. 23.	Large	586	40	524	20	62	20	Lt. pink, oval.
30	Early Envoy	Fair	" 25.	"	575	40	495	00	80	40	Pink, round.
31	Irish Cobbler	"	" 23.	M. to L.	575	40	502	20	73	20	Wh. flat.
32	Vick's Extra Early	Rank	Sept. 1.	V. large	568	20	520	40	47	40	Wh. pink, flat.
33	Carman No. 1	"	" 11.	"	564	40	509	40	55	00	White, flat.
34	I. X. L.	"	" 1.	M. to L.	561	00	524	20	36	40	Pink, long.
35	Early Rose	Weak	Aug. 22.	Med.	553	40	458	20	95	20	Pink, round.
36	Bovee	"	" 22.	Large	542	40	476	40	66	00	" long.
37	Dalmeney Kidney	V. rank.	Not ripe.	V. large	535	20	506	00	29	20	White, oval.
38	Everett	Weak	Aug. 22.	Large	531	40	462	00	69	40	Pink, long.
39	Seedling No. 7	Rank	Sept. 5	"	520	40	484	00	36	40	D., red.
40	British Queen	"	Not ripe.	"	484	00	432	40	51	20	Wh., oval.
41	Early Elkinah	Fair	Aug. 29	"	469	20	425	20	44	00	Pink, kidney.
42	Early Andes	"	" 22.	Med.	454	40	388	40	66	00	White, round.
43	Extra Early Eureka	Rank	Sept. 11.	"	432	40	377	40	55	00	Pink, kidney.
44	Dooley	"	" 12.	V. large	403	20	374	00	29	20	White, round.
45	Rawdon Rose	Weak	Aug. 22.	Large	381	20	319	00	62	20	Light, pink, oval.
46	Pingree	"	" 21.	Med.	348	20	300	40	47	40	White, oval.
47	Admiral Dewey	"	" 28.	"	326	20	278	40	47	40	" long.
48	Rochester Rose	"	" 23.	"	308	00	216	20	91	40	Light, pink, long.
49	Naught Six	Fair	Sept. 1.	Large	291	00	227	20	69	40	White, round.

EXPERIMENTS WITH GRASSES.

Owing to abundant rains the yield of grasses and pasture has been good in all parts of this province. It was, however, somewhat difficult to cure owing to heavy growth and frequent showers. Where the crop is heavy the use of a hay tedder is a great advantage, by its use the hay can be cured quicker and much more uniformly.

While Timothy and Western Rye grass can be cured in the bunch or cock, Brome grass requires to be thoroughly cured before being cocked, otherwise it turns dark in colour and is very dusty.

Variety.	Sown.	Height.	Seed per Acre.	Yield of Hay per Acre.	
		Inch.	Lbs.	Tons.	Lbs.
Timothy	1902	44	9	2	200
"	1903	47	9	2	1,000
Bald Wheat grass *(Elymus Virginicus)*	1903	53	12	2	200
Western Rye grass *(A. tenerum)*	1902	48	11	2	100
Western Rye grass *(A. tenerum)*	1903	47	11	2	1,000
Austrian Brome *(Bromus inermis)*	1902	60	12	2	1,400
Austrian Brome *(Bromus inermis)*	1903	47	12	3	1,900
Red Top *(Agrostis vulgaris)*	1902	38	15	2	600
Hard Fescue *(Festuca duriuscula)*	1900	35	15	2	1,000

EXPERIMENTS WITH CLOVERS.

The fall of snow was light last winter, but all kinds of clover wintered well, both new and old fields giving fair returns.

From several years' observation I am of the opinion that most of the failures with clover can be traced either to the use of a nurse crop of grain the first year, where the grain is allowed to ripen, or to close pasturing in the autumn. We have found that clover invariably winter kills if pastured late in the fall, enough growth should be left to catch the snow, which is one of the very best protectors.

ONE ACRE PLOTS OF CLOVER.

The three plots of clover sown in 1904 produced a luxuriant crop which was a constant source of attraction to visiting farmers all summer. The seed was sown on June 1, 1904, on summer-fallowed land with half a bushel of barley per acre; this was cut while green and removed from the ground, the clover then grew rapidly and before winter all three kinds had fully occupied the ground. The accompanying tables give the yield per acre. The alsike clover was only cut once as the aftermath was light.

Varieties.	Height.	Condition When Cut.	Yield of Hay per Acre.		Total Yield per Acre.	
	Inch.		Tons.	Lbs.	Tons.	Lbs.
Common Red, first cutting	43	Full bloom	2	395		
" second cutting	12	"	1	468	3	863
Alfalfa, first cutting	50	$\frac{1}{10}$ in bloom	1	1,348		
" second cutting	24	$\frac{1}{10}$ "	1	552	2	1,900
Alsike	37	Full bloom	2	518	2	518

The following table gives the yield and other particulars regarding the one-twentieth acre plots of clover, all were sown in spring on ploughed stubble without a nurse crop and the weeds and volunteer crop of grain was kept cut during the first summer. The plot of mixed timothy and alsike was very luxuriant, evidently this is a mixture well adapted to this section of country:—

Variety.	Sown.	Height.	Stage when Cut.	Yield of Hay per Acre.	
		Inch.		Tons.	Lbs.
Alfalfa, first cutting	1902	56	$\frac{1}{10}$ in bloom	2	800
" second cutting	1902	24	$\frac{1}{10}$ "	1	700
Total weight of two cuttings				3	1,500
Alfalfa, first cutting	1903	49	$\frac{1}{10}$ "	2	1,100
" second cutting	1903	24	$\frac{1}{10}$ "	1	100
Total weight of two cuttings				3	1,200
Alsike and Timothy	1903	37 to 44	Fully in bloom	3	200
Common Red Clover	1902	40	"	2	1,000

Several acres of clover were sown during May of this year, along with a light seeding of oats, with the intention of cutting the grain in a very early stage, but growth was unusually rank and the oats lodged before they could be harvested, and a large proportion of the clover plants were smothered. This land has been left in stubble and the condition of the clover will be noted next spring.

CLOVER ON LIGHT GRAVELLY UPLAND.

In May this year a number of plots of light upland soil were sown to alfalfa and common red clover, both with and without a nurse crop of grain. There was a good catch on all the plots, but the growth of clover was much weaker where a nurse crop was used. None of the clover on these plots was mown or pastured, but was left to hold the snow during the winter.

EXPERIMENTS WITH MILLETS.

Seven varieties of this useful family of plants were grown, they represented nearly all the leading types, and as usual they attracted much attention from visiting farmers.

Although it is advisable to have specimen plots here of all the leading varieties, there are actually only three kinds suitable for this country, viz., Hungarian, Common and Green Californian, the other four varieties are all too coarse for general use. Common Millet is the only one that has matured seed here, the others have always been caught by fall frost before maturity.

Millet is not a safe food for horses when fed in large quantities, but we have had excellent results from feeding one sheaf per day to each horse during the winter months. As soon as the head is formed the crop is cut and bound loosely, in small sheaves, with the grain binder, this is well cured in the stook, and stacked outside until required.

This year all the varieties were grown on summer-fallowed land, the soil was a rich black sandy loam; the size of the plots for this test was one-fortieth acre. All were sown on May 27 and cut on September 1.

Variety.	Description.	Height.	Stage when Cut.	Yield of Hay per Acre.	
		Inches.		Tons.	Lbs.
Algerian	Very coarse	72	A few heads only	6	200
Hungarian	Fine quality	48	In full head	4	1,200
White Round French	Coarse	55	Seed nearly ripe	4	800
Italian	"	47	Head just formed	3	1,800
Green-Californian	Fine quality	48	Seed nearly ripe	3	1,400
Pearl or Cat Tail	Coarse	33	Not headed	2	1,800
Common	Fine quality	33	Seed nearly ripe	2	1,400

CATTLE.

The herd of cattle on the Experimental Farm now consists of eighteen animals, as follows:—

Name of Animal.	Breed.	Age.	Weight.
			Lbs.
Nancy	Shorthorn	5 years	1,510
Rose of Brandon	"	2½ "	1,290
Crocus	"	22 months	920
Daisy	"	16 "	840
James	"	9 "	660
Lily of Brandon	Ayrshire	3 years	1,295
Dentry	"	3 "	1,110
Haron	"	2 "	1,410
Snow Drop	"	11 months	620
Marie	Guernsey	3 years	770
Brandon Duke	"	14 months	760
Christie	Grade	5 years	1,210
Gretchen	"	7 "	1,625
Sis	"	2 "	1,050
Jenny	"	2 "	1,410
Margaret	"	23 months	970
Ruben	"	15 "	890
Julia	"	1 year	690

EXPERIMENTS IN FEEDING STEERS.

YEARLING STEERS COMPARED WITH TWO-YEAR OLDS.

This experiment was similar to that of last year's test, and the result is very much the same.

The twelve animals used for this experiment were Shorthorn grades of fair quality, purchased from a farmer near Oak river, Manitoba. Six of them were about 18 months old when feeding started, and the others about 30 months old.

They were purchased early in November, 1904, and cost, delivered at the barn, $3.25 per hundred pounds live weight, and sold in February, 1905, for $4 per hundred pounds.

The yearlings were not nearly as well finished as the two-year olds, and for export purposes would not have realized as much by 50 cents per hundred pounds, but all were killed in Winnipeg, and the purchaser gave the same price for each lot.

After two weeks of preparatory feeding they were divided into two groups according to age. All were tied in stalls and fed all they could eat up clean of the following ration:—

Straw	13	lbs.
Corn fodder	15	"
Corn ensilage	17	"
Swede turnips	10	"
Ground grain	4 to 9	"

DESCRIPTION OF FODDER.

The straw was mixed wheat, oat and barley. The fodder corn was principally Pearce's Prolific cut in the late milk stage and stooked in the field until wanted, both straw and corn fodder were cut into one-inch lengths.

The ensilage was also made from the above variety of corn, and was of excellent quality.

The grain was composed of one third each of barley, oats and wheat screenings.

A layer of cut fodder corn was first spread over the feed room floor, on this was placed successive layers of ensilage, sliced turnips, corn, straw and grain, it was then moistened with water and shoveled into a heap in the corner of the room, when fed 12 hours later fermentation had commenced and the mixture was quite warm.

The amount of grain fed was increased slightly each month until the test was completed.

COMPARATIVE GAINS.

—	Date.	Weight.	Gain.	Total Gain of six Steers.
One year old Steers.		Lbs.	Lbs.	Lbs.
Original weight of steers	Nov. 15, 1904	4,960		
Weight at end of 1st term	Dec. 13, 1904	5,350	390	1,170
" 2nd "	Jan. 10, 1905	5,545	195	
" 3rd "	Feb. 7, 1905	5,845	300	
" 4th "	March 7, 1905	6,130	285	
Two year old Steers				
Original weight of steers	Nov. 15, 1904	7,175		
Weight at end of 1st term	Dec. 13, 1904	7,500	325	975
" 2nd "	Jan. 10, 1005	7,735	235	
" 3rd "	Feb. 7, 1905	7,995	260	
" 4th "	March 7, 1905	8,150	155	

COST OF FEEDING.

Six yearling steers—

9,900	lbs. of fodder corn at $4 per ton	$19 80
8,720	" mixed straw at $1 per ton	4 36
6,549	" turnips at 5 cents per bushel	5 45
11,118	" ensilage at $2 per ton	11 11
3,996	" ground grain at 75 cents per 100 lbs.	29 97
		$70 69

Six two-year old steers—

10,000	lbs.	of fodder corn at $4 per ton	$20 00
8,880	“	mixed straw at $1 per ton	4 44
6,720	“	turnips at 5 cents per bushel	5 60
11,424	“	ensilage at $2 per ton	11 42
4,046	“	ground grain at 75 cents per 100 lbs	30 34
			$71 80

SUMMARY OF RESULTS.

—	First cost of each steer.	Value of feed consumed.	Price per steer sold.	Gain per day.		Profit per steer.
	$ cts.	$ cts.	$ cts.	Lbs.	Oz.	$ cts.
One-year old steers	26 86	11 78	40 86	1	11	2 22
Two-year old steers	38 86	11 96	54 33	1	07	3 51

CONCLUSIONS.

The results of both this and last years' experiments would lead us to the following conclusions:—

1st. The amount of gain in weight per day is practically the same with each lot of steers.

2nd. The two-year olds were in both instances more profitable than the one-year olds.

3rd. There is very little profit in fattening steers when the difference between the buying price in the fall and the selling price in the spring is not more than $1 per hundred pounds.

MILKING COWS.

The accompanying table gives the length of the milking period and the weight of milk given by a number of the experimental farm cows for the past year:—

MILKING COWS.

Name.	Age.	Breed.	Milking Period.	Pounds of Milk.	Average each day.
Myrtle	6 years.	Shorthorn	285 days.	2,988½	10 lbs.
Nancy	5½ 〃	〃	365 〃	3,770	10 〃
Alice May	5 〃	〃	300 〃	5,381½	17 〃
Denty	5 〃	Ayrshire	305 〃	5,278	17 〃
Brandon Maid	4 〃	Guernsey	298 〃	6,407	21 〃
Christie	7 〃	Shorthorn Grade	343 〃	9,326	27 〃
Gretchen	6 〃	〃 〃	331 〃	5,790	17 〃
Carrie	9 〃	〃 〃	332 〃	6,732½	20 〃
Pet	7 〃	〃 〃	253 〃	2,854½	11 〃
Jennette	8 〃	〃 〃	313 〃	6,039	19 〃

EXPERIMENTS WITH SWINE.

The herd of swine on this farm consists of Yorkshire, Berkshire and Tamworth.

FEEDING PIGS ON BROME GRASS, PASTURE AND GRAIN.

This experiment was undertaken for the purpose of ascertaining the value of Brome grass pasture when supplemented with a limited amount of grain. Twelve pigs were used for this test, they were about six weeks old when the test began, six were nearly pure Berkshire and the others cross-bred York and Berkshire. All were nose-ringed before being turned into the pasture and no damage was done to the sod.

The mixed grain consisted of equal parts of barley, oats and wheat screenings; this was ground and mixed with water and allowed to soak for a few hours before feeding. This mixture was used during the first few weeks and was replaced later with whole pease fed dry.

The mixed grain was valued at 75 cents per hundred pounds and the pease $1 per hundred pounds. The pigs were valued at $2 each when the test began and were sold at $5.25 per hundred pounds, when the test was completed.

Amount and Value of Feed Consumed from May 25 to November 10.

—	Grain Fed.	Value of Feed.
Mixed grain chopped	900 lbs.	$6.75
Whole pease	700 "	7.00

Summary.

—	Weight when Bought.	Value when Bought.	Weight when Sold.	Value when Sold.	Value of Grain Fed.	Profit.
12 pigs	360 lbs.	$24.00	1,355 lbs.	$71.13	$13.75	$33.38

POULTRY.

Three breeds of poultry are kept on the Experimental Farm, namely:—Barred Plymouth Rocks, White Wyandottes and Rose Comb Minorcas.

Both setting hens and incubators were used for hatching purposes, with the results slightly in favour of the hens. One hundred and ten chicks were raised in brooders with less than ten per cent of a loss.

WHOLE GRAIN COMPARED WITH GROUND GRAIN FOR FATTENING FOWLS.

Eight pure bred Barred Plymouth Rock cockerels were selected for this test. They were shut up in slatted pens each 2 x 3 feet. The grain fed was ¾ wheat and ¼ oats. It was finely ground for No. 1 pen and unground for No. 2 pen. In the estimate of cost grain has been valued at 75 cents per hundred pounds. The ground grain was mixed with water to the consistence of thin porridge.

—	Live Weight, Nov. 16.		Live Weight, Dec. 7.		Gain in 21 Days.		Cost of Food.	Cost Live Weight per lb.
	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	Cts.	Cts.
Pen 1, fed ground grain	20	10	24	10	4	00	24	6
Pen 2, fed unground grain	20	13	23	13	3	00	21	7

CONCLUSIONS.

First, pen 1 consumed 4 pounds more feed than the others.

Second, pen 1 gained twenty-five per cent more flesh than No. 2.

Third, the ground feed produced flesh at 6 cents per lb. and whole grain at 7 cents per pound.

EXPERIMENTS WITH BEES.

Owing to the unusually open fall last year the bees were not placed in their winter quarters until November 28. One corner of the dwelling house cellar is used for this purpose; it is partitioned off from the rest of the cellar and kept quite dark, the temperature is regulated by means of a chimney flue, which is opened or closed as required. The bees are not placed in the cellar until the temperature here is below 50° above zero. During the winter the temperature is kept between 32° and 47°, it usually registers about 40°.

All of the 14 colonies placed in the cellar survived the winter, and with few exceptions they were in excellent condition when placed on their summer stands, on March 24 of this year. All were weighed when placed in their winter quarters and also when set out. There was a large variation in the amount of honey consumed by each colony, the highest was 28 pounds and the lowest 6 pounds. The average consumption per colony was 14 pounds.

The first pollen was obtained from the *Anemone patens* on April 7. Willow pollen was first gathered on April 21. The first honey was removed from the hives on June 12 and the first swarm appeared on June 28.

Thirty-eight pounds of extracted honey was produced per colony, spring count, and eight new swarms obtained.

Bees were noticed for the first time working on the Buffalo berry (*Shepherdia argentea*).

A TEST OF WINTER VENTILATION.

When placed in the cellar 9 of the hives were without cloth coverings and the board covers were raised half an inch above the hive sides, thus giving free ventilation through the hive. These 9 hives consumed an average of 15½ pounds of honey per hive.

On the other 5 hives the cloth covering was removed also, but the board covers rested tightly on the sides of the hive, thus allowing very little air to pass through the hive. These 5 hives only consumed 12¼ pounds of honey, or 3 pounds less than the others. In both cases the entrances were left wide open. Apparently it is not necessary to have a current of air passing through the hive, providing the cellar is kept well ventilated.

WORKING FOR A LARGE YIELD OF EXTRACTED HONEY.

The summers of this province are short, and one of the greatest apiarian problems is to produce the maximum yield of honey in this short period. Last summer two of our colonies, Nos. 3 and No. 4, were in excellent shape for a large production, they were both large early swarms of this summer from two pure Italian colonies; they were hived on empty combs and were given another super of empty combs a few days after swarming. These combs were extracted as follows:—

	Lbs.
On August 16, No. 4 gave	20
" 18 " 4 "	20
" 21 " 4 "	15
" 24 " 4 "	22
" 28 " 4 "	26
Total for 12 days	103

	Lbs.
On August 18, No. 3 gave	15
" 21 " 3 "	19
" 24 " 3 "	18
" 28 " 3 "	18
Total for 10 days	70

None of the combs were sealed over, but the honey was of good quality, and not at all watery.

HORTICULTURE.

APPLES.

I take pleasure in reporting some further progress in apple culture. This season in addition to a large crop of crab apples amounting to over 45 bushels, two varieties of Standard apples fruited, viz., Hibernal and Duchess of Oldenburg, also a very large number of crosses between the standard apples and the crabs.

For some years a considerable amount of both root and top grafting has been carried on here, using as stock the Berried crab (*Pyrus baccata*), a hardy and readily propagated crab apple, and scions from varieties which showed special adaptability to our somewhat rigorous climate. This work has resulted in the production of some very promising fruit and gives us every reason to hope that in a few years we will have a number of varieties of apples hardy in all parts of Manitoba.

The tree of Hibernal was root grafted on Berried crab stock in 1901. Although growing in a much exposed position it showed only a slight injury on the tips of the branches from winter killing. The fruit was about 3½ inches in diameter, and was of good flavour and excellent for cooking purposes.

The Duchess of Oldenburg which fruited was the result of top grafting on the Berried crab. The fruit was about 2½ inches in diameter free of scab, of good colour and flavour.

Among the other trees that fruited for the first time were some excellent Martha crab seedlings, one in particular named 'Maggie' is of considerable promise, the flavour greatly resembles that of a standard apple.

Each fall the fruit of all the Berried crabs grown on the farm is pulped and the seed sown. This year several thousand seedlings of this tree were grown and will be available for grafting next spring.

TRANSCENDENT CRAB.

Most of the trees of this variety that fruited during the year were top grafted on large *Pyrus baccata* trees in the spring of 1903. The branches were loaded with fruit free of scab and of excellent size and flavour. The successful production of this fruit in all parts of Manitoba would of itself prove a great boon to the settlers of the province.

PLUMS.

The orchards of this fruit now consist of 358 trees, most of which are selected native seedlings, but there are also a few named varieties and seedlings of the American group.

Native Manitoba Plum.—These are much earlier than any other plums grown here, many of them ripening their fruit by August 15. Like all seedlings they vary greatly. From many hundreds grown here, about ten are of superior excellence; these are being propagated and some of them will be available shortly, for testing in other parts of Manitoba.

CURRANTS.

Thirty-three varieties of currants were grown here this season, most of which produced a fair crop. Just as the fruit commenced to ripen the currant worm appeared but it was quickly checked by a spraying of Hellebore and water. The accompanying table gives the names of the varieties grown, together with the yield and quality of the fruit.

Variety.	Colour.	Flavour.	Length of Bunch.	Fruit on Bunch.	Weight from one Bush.
			Inches.		Lbs.
Defiance	Red	Sweet	2⅛	Well set	1¼
Houghton Castle	"	"	2¼	Thick set	1½
Large Red	"	Fairly sweet	2½	"	2½
Simcoe	"	Acid and juicy	2	Thinly set	1½
Pomona	"	Sweet, very juicy	2½	Thick set	3¼
Long Bunch Holland	"	Sweet and juicy	2		1¾
Prince Albert	"	"	2	Thinly set	11/16
Red Dutch	"	"	2	Thick set	2
New Red Dutch	"	"	1¾	"	3
Goliath	"	"	1½	"	1¼
North Star	"	"	2¼	"	1¾
Admiral	White	"	2½	"	¾
White Imperial	"	Slightly acid	2¼	"	1½
Climax	"	Sweet	2	"	2½
Large White	"	"	2¼	"	2¾
White Cherry	"	" thin skin	2¼	"	3
Verriers White	"	Very sweet	3	Thinly set	3
White Dutch	"	Fairly sweet	2½	"	1¼
White Kaiser	"	Sweet	2¼	Thick set	1
White Grape	"	Slight acid	2½	"	1¼
White Pearl	"	Fairly sweet	2	"	¾
Wentworth's Leviathan	"	Sweet	1½	Thinly set	½
Prince of Wales	Black	Good thin skin			¾
Black English	"	Juicy "			½
Sterling	"	" "			2
Star	"	Fairly sweet and juicy			1¼
Kentish Hero	"	Sub-acid and juicy			¾
Eagle	"	" "			1
Standard	"	Sweet dry thin skin			2¼
Winona	"	" thin skin			1
Baldwin's Black	"	Juicy thick skin, sub-acid			¾
Dominion	"	Sub-acid, dry			1
Percy	"	Sweet juicy thick skin			¾

GOOSEBERRIES.

Twenty-five varieties of gooseberries were grown here this year. Nearly all the varieties were heavily laden with fruit of excellent flavour and fair size.

STRAWBERRIES.

A number of Alpine strawberries were received from the Central Experimental Farm in the spring of 1904 and made fine growth before winter set in, they were then covered with a light coat of strawy manure, and during the season bore a fair quantity of fruit, but these were eaten by birds before they were ripe.

RASPBERRIES.

The raspberry crop this season was very good, the yield being much above the average. Every fall the canes are bent over and covered with manure in order to prevent winter killing. The following are the varieties which have proven the best both in quantity and quality: Cuthbert, Reider, Climax, Turner, Empire, Sarah, Niagara and London.

AVENUES.

The avenue trees on this farm are mostly native ash-leaf maples. Where the soil is not too wet and is fairly free of alkali they are quite thrifty, but several vacancies have occurred owing to wet land or alkaline soil. One of the best avenues is composed of a double row, native white spruce on the outside and maples on the inside. This avenue is attractive both in summer and winter.

The Russian poplar avenue on the eastern boundary of the Farm is still growing vigorously. During the summer months its dark green foliage and glossy leaves are distinguishable at a long distance, a few of the trees show signs of canker.

Cottonwood trees have only succeeded here, when planted close to running water, on high, well drained land they have invariably rusted badly, for this reason they have not been used for avenue purposes.

ABORETUM.

A considerable addition was made to the stock of trees during the past season. All were received from the Central Experimental Farm in the spring. These consisted of pines, cedars, silver firs, junipers and several flowering shrubs, including Philadelphus in variety and Syringa Amurensis, these were planted in the Arboretum around the superintendent's house, and all made good growth during the season.

FALL AND SPRING SOWING OF MAPLE SEED.

Until last year we have usually sown native maple seed in the spring, but an experiment was made during the fall of 1904 to ascertain if any advantage accrued from autumn sowing.

From one row 270 feet long of spring sown seed 2,600 trees were obtained while only 900 trees grew in the adjoining row sown in the fall, this was due largely to the last named germinating early in spring and then freezing off close to the ground.

VEGETABLE GARDEN.

PEASE—A TEST OF VARIETIES.

Forty-eight varieties of pease were sown in the open on May 9. Germination was excellent except with the following varieties: Admiral, Extra Early Leviathan, Dwf. Telephone, and Sharpe's Queen.

All of the following varieties ripened their seeds. The accompanying tables are arranged in order of earliness:—

PEASE—TEST OF VARIETIES.

Number.	Varieties.	Sown.	Blossom	Length of Pod.	Length of Vine.	Pease in Pod.	Flavour.	Ready for use.	Productiveness.
				In.	In.				
1	E. E. Philadelphia	May 9	June 16	2¾	42	7- 8	Sweet	July 15	Fairly.
2	Gregory's Surprise	" 9	" 23	3	36	6- 8	"	" 10	"
3	First of All	" 9	" 20	2¾	30	7	Poor	" 12	"
4	Extra Early Market	" 9	" 16	2½	36	7- 8	"	" 15	"
5	American Wonder	" 9	" 23	3	24	7	Good	" 15	Very.
6	Nott's Excelsior	" 9	" 23	3	24	6- 8	Very sweet	" 15	"
7	Alaska	" 9	" 23	3	42	6	Poor	" 15	Not.
8	Best Extra Early	" 9	" 16	2	24	6	"	" 15	Very.
9	Prosperity	" 9	" 20	3½	48	8- 9	Very sweet	" 18	Not.
10	Duke of York	" 9	" 23	4	48	7- 9	Sweet	" 20	Very.
11	Duke of Albany	" 9	" 23	4½	72	8- 9	Very sweet	" 20	"
12	Thomas Laxton	" 9	" 23	3	36	6	Good	" 20	Fairly.
13	Sutton's Excelsior	" 9	" 23	3	24	6- 7	Very good	" 20	"
14	Rivenhall Wonder	" 9	July 5	4	24	4- 6	Very sweet	" 22	"
15	Sutton's Satisfaction	" 9	" 5	3	36	4- 6	"	" 22	"
16	Fill Basket	" 9	" 5	3½	30	7- 9	"	" 22	Very.
17	Telephone	" 9	" 5	4½	54	8-10	Very good	" 22	"
18	Premium Gem	" 9	" 25	3	30	4- 6	Poor	" 22	Not.
19	Dwarf Champion	" 9	" 5	3½	30	6	Sweet	" 24	Fairly.
20	Prince of Wales	" 9	" 5	2¾	36	4- 7	Very sweet	" 24	"
21	McLean's Blue Peter	" 9	Jnne 30	2½	24	6	Sweet	" 24	"
22	Extra Early Exonian	" 9	" 30	2½	36	6	"	" 22	Very.
23	William Hurst	" 9	" 23	3	24	8	Very sweet	" 20	"
24	Petit Pois	" 9	July 5	3½	36	10	Poor	" 24	"
25	S. B. Everbearing	" 9	" 5	3	36	4- 6	Fairly sweet	Aug. 1	Fairly.
26	McLean's Little Gem	" 9	June 30	3	48	6	"	" 1	"
27	Shropshire Hero	" 9	July 5	3	48	8	Very sweet	" 1	"
28	British Empire	" 9	June 30	4½	36	10	Sweet	" 1	"
29	Hor. Market Garden	" 9	July 5	3	36	9	Fairly sweet	" 1	Very.
30	Pride of the Market	" 9	" 5	4	36	9	"	" 1	Fairly.
31	Imp. Stratagem	" 9	" 5	3½	36	5- 8	Very sweet	" 1	Very.
32	Heroine	" 9	" 5	4	48	8	Sweet	" 1	Fairly.
33	Yorkshire Hero	" 9	" 5	3½	30	5	Very sweet	" 1	"
34	Queen Pea	" 9	June 25	4½	48	9	"	" 1	"
35	Abundance	" 9	July 5	2½	36	6	Fairly sweet	" 1	Very.
36	Burpee's Profusion	" 9	" 5	3½	48	5	Sweet	" 1	"
37	Juno Pea	" 9	" 5	3½	36	8	Poor, dry	" 12	"
38	Telegraph	" 9	" 5	4	48	7	Dry	" 1	Fairly.
39	Laxton's Alpha	" 9	June 30	2½	48	7	Poor	" 1	"
40	Reliance	" 9	July 6	3	60	5	Sweet	" 1	Very.
41	Champion of England	" 9	" 5	3½	72	6	Fairly sweet	" 5	"

CUCUMBERS.

Twenty-nine varieties of cucumbers were sown in the open on May 23, in hills six feet apart each way. Although they were greatly injured by the June frost a very heavy crop of fruit was harvested.

The following is the result of this test:—

Varieties.	Productiveness.	Length.	Diameter.	Colour.	Ready for Use.	Weight.	Flavour and Texture.
		In.				Ozs.	
Arl. Ely. White Spine	Moderately.	6	3	Lt. green.	Aug. 1	11	Good.
New Siberian	Very	6	3¼	"	" 1	12	Fair.
Green Prolific	"	5½	2¼	Dk. green.	" 3	9	V. good.
Paris Pickling	Productive.	8	3	Lt. "	" 8	11½	Good.
Cool and Crisp	Med	7	2¾	Dk. "	" 8	8	Fair.
Ely. White Spine	V. prolific.	8	2½	" "	" 8	9	V. good.
S. B. Evergreen	Productive.	7	2½	" "	" 11	7	"
Cumberland	Very	8	2¾	Lt. "	" 11	12	"
Boston Pickling	Fairly	6¾	2½	Dk. "	" 11	8	Good.
White Wonder	Very	7	3	White	" 11	10	Very.
Evergreen Cluster	"	6½	2½	Lt. green.	" 11	7	Fair.
Short Green	Fairly	6	2¼	"	" 14	6	"
Imp. Long Green	Very	8	3	Dk. green	– 14	9	V. good.
Chic. Westerfield	"	5	3	"	" 14	8	Fair.
New Orleans	"	8	3	Lt. "	" 14	10	V. good.
Prince	"	8	3	"	" 14	12	"
Hills F. W. Spine	Fairly	8	3	"	" 14	11	"
Jap. Climbing	Mod	6	2	"	" 14	7	Poor.
Tailby Hybrid	Fairly	7	2½	"	" 14	6	Good.
Short Green Gherkin	"	5½	2¼	Lt. "	" 14	7	Fair.
Farquhar's Perfection		6	3	"	" 14	8	Good.
Thorburn's Everlasting	Very.	5¼	3	"	" 14	5½	Fair.
Pride of Canada	V. prolific.	11	2½	White	" 14	12	V. good.
Nichol's Med. Gem	Not	5¼	3	Green	" 14	6	Good.
Giant Pera	Prolific	10	3	Lt. green.	" 14	12	Excellent.
Long Green Turkey	Productive.	8½	3	Dk. "	" 14	10	V. good.

ONIONS.

Six varieties of onions were sown on March 29 in rows 12 inches apart, by hand. The germination was good in all cases and the varieties gave about an average in yield and quality.

The following gives the result of this test arranged in order of productiveness:—

Variety.	Sown.	Pulled.	Colour.	Shape.	Average Weight of Bulb.	Yield per Acre.
					Oz.	Bush.
Danver's Yellow Globe	Mar. 29	Sept. 18.	Light yellow	Globular	5½	517
Trebon's Large Yellow	"	"	" "	Globe	6	594
Red Wethersfield	"	"	Dark red	Flat	7½	528
Market Favorite Keeping	"	"	Dark yellow	"	4½	176
Australian Yellow Globe	"	"	Light "	Globular	4½	513

SQUASH AND PUMPKINS.

Five varieties of squash and pumpkins were sown in the open on May 15, in hills 8 feet apart each way. The late spring frost prevented the best results being obtained, although a fair crop was harvested, the varieties coming quite up to their average size. The following results were obtained:—

Varieties.	Sown.	Texture and Flavour.	Ripeness.	Average Weight.
			p. c.	Lbs.
Orange Marrow	Yellow	Very good	90	7½
Long White Bush Marrow	Yw. white.	〃	100	13
English Vegetable Marrow	〃 〃	〃	95	11
Field Pumpkin	Yellow	Very coarse.	85	25
Sweet or Sugar Pumpkin	Dk. yellow.	〃 good	90	6

FRENCH BEANS.

Seven varieties of beans were sown in the open on May 13, in rows 30 inches apart, but on account of the June frost rather a light crop was obtained.

The results of this test are given below. The varieties being arranged in order of earliness:—

Varieties.	Sown.	Ready for use.	Length of pod.	Productiveness.
			Inches.	
Dwf. Matchless	May 13	July 27	6	Very good.
Fame of Vitry	〃 13	〃 27	7	〃 〃
Dwf. Extra Early	〃 13	〃 29	6½	Prolific.
Dwf. B. Speckled	〃 13	〃 29	7¼	Fairly.
Dwf. Early China	〃 13	〃 27	6	Very productive.
Emperor of Russia	〃 13	〃 29	6	〃 〃
B. B. Arlington Windsor	〃 13	〃 25	5	〃 〃

PARSNIPS.

One variety of parsnips was sown on April 3, one foot apart, by hand, and lifted October 19. The variety was Hollow Crown, and the yield per acre was 946 bushels.

CARROTS.

Three varieties of carrots were sown in the open on May 11 in rows one foot apart. The yield of all the varieties was an average one.

CABBAGE.

Eight varieties of cabbage were sown under glass on March 28, and transplanted to the open on May 15. All did well.

The following table gives the results of the test:—

Varieties.	Sown.	Planted out.	Ready for use.	Description.	Average weight.
					Lbs.
Paris Market	March 28	May 15	June 25	Solid.	6½
Express	" 28	" 15	" 25	"	7¼
Early Jersey Wakefield	" 28	" 15	July 20	V. solid	7
Fottler's Improved	" 28	" 15	" 20	"	6
Winnigstadt	" 28	" 15	" 31	"	7½
Savoy Cabbage	" 28	" 15	" 31	V. good	6½
Large flat Drumhead	" 28	" 15	Aug. 15	Solid.	12
Marblehead	" 28	" 15	" 25	Coarse.	14

SWEET CORN.

Five varieties of corn were sown this year. Squaw corn was the only variety which ripened.

The following are the results obtained from this test:—

Varieties.	Sown.	Ready for use.	Flavour.	Seed ripened.
Squaw Corn	May 13	August 5	Good	Sept. 20.
New Premo	" 13	" 15	Very good	Did not ripen.
Extra Early White Cory	" 13	" 15	" "	" "
Sweet Peep O'day	" 13	" 20	Good	" "
New Windsor	" 13	" 23	"	" "

GARDEN TURNIPS

Four varieties of turnips were sown in the open on May 11, by hand, in rows 2 feet apart. The yield per acre has been calculated from the yield of one row 66 feet long.

Variety.	Sown.	Ready for use.	Shape.	Flavour.	Lifted.	Yield per Acre.	
						Tons.	Lbs.
Robertson's Golden Ball	May 11	July 1	Round	Good	Sept. 20	49	1000
Extra Early White Milan	" 11	" 1	Flat	Fairly good.	" 20	12	1080
Early Stone	" 11	" 1	"	Fair	" 20	36	270
E. W. S. A. Stone	" 11	" 1	Round	"	" 20	29	1400

BEETS.

Three varieties of beets were sown in the open on May 11, in rows 2 feet apart, and were lifted September 19. Average yield per acre, 31 tons.

TOMATOES.

Two varieties of tomatoes were sown under glass and transplanted to the open on June 1. These were all killed with the June frost, but were replaced with a fresh lot of plants, and they produced a large quantity of ripe fruit.

CAULIFLOWER.

Three varieties were sown under glass March 28, and transplanted to the open May 15. The following are the results obtained:—

Variety.	Sown.	Planted out.	Ready for use.	Description.	Average weight.
					Lbs.
Early Snow Ball	March 28	May 15	June 24	Good	$3\frac{1}{2}$
Half Early Paris	" 28	" 15	" 30	Very good	$3\frac{3}{4}$
Dwarf Erfurt	" 28	" 15	July 15	" "	$3\frac{1}{2}$

RHUBARB.

Eighteen varieties of this useful plant were grown here for testing purposes this season. All varieties did well.

The following are the results obtained:—

Variety.	Colour.	Texture.	Weight per Plant.	Flavour.
			Lbs.	
Samyster's Prince of Wales	Light red	Soft	12	Very good, juicy.
Early Scarlet	Deep red	Crisp	12	Good.
Early Prince	Light red	Very crisp	24	Juicy.
Tobolsk	"	Crisp	36	Acid.
Paragon	Greenish	Stringy	23	Very acid.
Prince Albert	"	Crisp	37	Sweet.
Magnum Bonum	Light red	"	39	Good.
Brabant's Colossal	"	Stringy	41	Poor.
Early Crimson	Greenish	Soft	24	Very tart.
Scarlet Nonpareil	Red	Crisp	36	Juicy.
General Taylor	Green	Stringy	29	Poor.
Giant	Red	Tender	43	Juicy.
Salt's Perfection	Green	Very poor	9	Poor.
Royal Albert	Deep red	Crisp	22	Acid.
Strawberry	Light red	Tender	30	Good.
Tottle's Improved	Light green	Crisp	28	Very good.
Victoria	Light red	"	37	Good.
Myatt's Linnæus	"	Tough	47	Fairly good.

FLOWER GARDEN.

A large number of annuals were, as usual, sown in shallow boxes under glass and transplanted to the flower garden on June 1, most of them made a fine display of varied colours. Some difficulty was experienced in bringing some of the seedlings through safely. On account of late spring frosts Balsams, Zinnias and Tagetes were completely destroyed on April 30 in spite of the protection afforded by a thick covering of canvas. A second sowing on April 30 produced good strong plants, which were soon available for planting.

ANNUALS SOWN OUTSIDE.

The following mixed collection of annuals sown in the open on May 10 made a fine colour effect, visitors frequently expressing their admiration of the charming display:—

Clarkia mixed,
Coreopsis,
Candytuft,
Abronia umbellata,
Godetia,
Portulaca double,
Poppies mixed,
Gypsophila elegans,
Nasturtium mixed,
Sweet Alyssum.

TENDER PERENNIAL BULBS.

A test was made last year of tender bulbs to ascertain the possibility of flowering some of the more tender kinds, such as Hyacinths, Narcissi, &c., by using a heavy covering of strawy manure. The covering was taken off in the spring. Most of the bulbs on examination were found to be rotten, the Narcissus, however, came through safely and produced some magnificent blooms. The varieties saved were Sir Watkin and Emperor. A fine lot of different varieties of bulbs have been added to the collection this season; these have been planted in beds and borders.

IRIS KAEMPFERI (*Japan Iris*).

A valuable addition to our collection of this beautiful perennial was received from the Central Experimental Farm at Ottawa, in the spring of 1905 and planted in the perennial garden. These produced some very fine specimens of blooms, which were greatly admired. The following is a list of those that flowered:—

Name.	Colour.	Number of Petals.	Diameter of Flower.	Height.	Time of Flowering.
			Inches.	Inches.	
Kasu-gano	Light blue	6	6	15	July 30.
Shiye-no-yuki	Purple	3	5	15	" 30.
Datedogu	Pink	5	6	18	" 30.
Koki-no-iro	Purple	6	6	15	" 30.
Senjo-no-hora	Pink striped	6	5	12	Aug. 2.
Tsutsu-izutsu	P. Wh. striped	6	6	12	" 2.
Sumida-gawa	Whitish	3	6	15	" 2.
Goko-no-asobi	Purple	8	4	14	" 2.

PAEONIA OFFICINALIS (*Herbaceous Paeonies*).

We would again call particular attention to this king of hardy herbaceous perennials often erroneously called 'Piney Rose.' It is a matter of regret that although adapted in every way to the climatic conditions of the west comparatively few can be found throughout Manitoba. With a constitution that obviates the necessity of the slightest protection and increasing in size of plant and number of blooms from year to year, a few plants give such generous returns for a small expenditure of labour.

The Paeony begins to bloom toward the end of June and continues throughout July, with flowers ranging from 8 to 10 inches in diameter of various colours, many of them possessing a delicate perfume. They present a mass of colour, which never fails to elicit the greatest admiration. Some of the clumps on the Experimental Farm are now 4 to 6 feet in diameter and produce annually an average of 30 to 40 flowers each, perfectly double and of the most delicate colouring and texture. It is a fact worthy of note that although many of the clumps growing on the farm have remained in the same position since planting (eight to ten years ago) that they show no symptoms of deterioration, which is quite contrary to the general opinion that they require lifting and dividing every few years.

Many varieties can now be purchased having a wide range of colour and form, this fact, combined with their exceeding hardiness and freedom from disease, places them in the foremost rank of our hardy herbaceous perennials. We may mention that propagation is effected by division of the root in a similar manner to that of rhubarb.

DISTRIBUTION OF GRAIN, POTATOES, FOREST TREES, SHRUBS, &c

Seedling trees and shrubs	pkgs.	600
Potatoes in 3-lb. bags		206
Wheat in 3-lb. “		131
Oats in 3-lb. “		100
Barley in 3-lb. “		40
Pease in 3-lb. “		72
Maple seed in 1-lb bags		80
Rhubarb seed	pkgs.	33
Total		1,229

Number of farmers reporting on their experience with oats	15
“ “ “ “ wheat	11
“ “ “ “ barley	5
“ “ “ “ potatoes	42
“ “ “ “ pease	5

Largest yield obtained from	3	lbs.	wheat (Preston)	110 lbs.
“ “	3	“	oats (Banner)	101 “
“ “	3	“	barley (Odessa)	72 “
“ “	3	“	potatoes (Uncle Sam)	272 “
“ “	3	“	pease (English Grey)	55 “

VISITORS.

Owing to the great interest taken in the agricultural advancement and possibilities of this country, and the increased importance of the city of Brandon as a centre for farming purposes, the number of visitors to the Experimental Farm is increasing every year. It is estimated that over 18,000 visitors called at the farm during the past year. A large number of these were parties examining the country with the idea of becoming settlers in the west.

The farm was also visited by a number of the leading newspaper correspondents of the United States, and favourable comments were made on the work of this farm by the newspapers they represent.

Many excursion trains were run to the farm from towns on the main line of the Canadian Pacific Railway, also from along the line of the Pembina branch.

FARMERS' MEETINGS.

During the year more farmers' meetings were attended by me than usual. The attendance at these meetings was generally large, and considerable interest was shown in the subjects discussed. Meetings were attended and addresses given at the following places:—

Portage la Prairie	December 12, 1904
Winnipeg	January 25, 1905
Brandon	February 8, 1905
Minnedosa	" 16, 1905
Winnipeg	" 24, 25, 1905
Deloraine	May 29, 1905
Melita	" 30, 1905
Hartney	" 31, 1905
Souris	June 1, 1905
Reston	" 2, 1905
Virden	" 3, 1905
Portage la Prairie	" 13, 1905
Rapid City	" 15, 1905
Portage la Prairie	October 29, 1905

Meteorological Tables for Brandon, Man.

Months.	Highest Temperature.		Lowest Temperature.		Total Rainfall.	Total Snowfall.	Total Sunshine.
1904.	Day.	Deg.	Day.	Deg.	Inches.	Inches.	Hours.
December	29	40	27	−34	....	2	61·7
1905.							
January	18	30	10	−45	....	8	118·4
February	27	47	2	−43	....	½	165·
March	25	60	10	−21	·72	3½	57·3
April	25	78	30	11	·06	....	215·1
May	31	80	5	21	2·59	2	208·6
June	3	86	10	31	4·53	....	187·5
July	10	87	24	39	4·06	....	297·6
August	3	85	23	39	2·37	....	249·4
September	27	87	24	33	3·02	....	206·3
October	3	73	28	−3	·15	5	124·4
November	10	56	30	−24	·11	½	88·5
					17·61	21½	1,979·8

SAMPLES FOR EXHIBITION.

A number of samples have been prepared for the immigration offices and for exhibitions held in Europe and other places.

The Department of the Interior was also supplied with a quantity of grain and grasses for the same purpose.

CORRESPONDENCE.

During the past year 4,783 letters were received and 3,140 despatched, irrespective of circulars sent out.

I have the honour to be, sir,
Your obedient servant,

S. A. BEDFORD,
Superintendent.

EXPERIMENTAL FARM FOR THE NORTH-WEST TERRITORIES.

Experimental Farm, Indian Head, Sask.,
November 30, 1905.

Dr. Wm. Saunders, C.M.G.,
Director Dominion Experimental Farms,
Ottawa.

Sir,—I have the honour to submit to you the eighteenth annual report of the operations of the Experimental Farm for the North-west Territories at Indian Head, Sask., during the year 1905.

The past season has been, without an exception, the most favourable for grain of all sorts the Territories have ever experienced. In past years, over so wide an extent of territory, some districts or large sections of country would have more or less poor crops. This year, however, all rejoice in a most bountiful harvest. In many places the crop was excessively heavy, causing considerable expense in securing it.

Very little snow fell during last winter, and after February 14 little or no severe weather took place. Seeding could have been done in any part of the Territories during the last half of February and all of March, and in some cases grain was sown within this period.

April opened very fine, and seeding became general over the whole country the first few days. During the month one or two cold spells occurred, but did not interfere with seeding, which was completed early, and better than for many preceding springs.

Grain as a rule germinated early and evenly, and under heavy showers and warm weather in May and June growth was very rapid, and in some districts very rank.

Harvest commenced from August 20 to 25, as a rule, with some districts a few days earlier. Unfavourable weather, with heavy showers, retarded the cutting. No delay in harvesting took place from backward growth, as the grain all ripened evenly and fast.

On September 4 the temperature was very near the freezing point, and no doubt, from results shown by threshing, did reach that point in some places. The first frost shown by instruments on the Experimental Farm was on Tuesday, September 12, when one degree was recorded.

From the excessive quantity of straw, and unfavourable weather, threshing has been both tedious and expensive this fall, and at the present time considerable has yet to be done. Very heavy yields are being obtained everywhere, showing the wonderful fertility of the soil when conditions are favourable.

EXPERIMENTAL FARM CROPS.

The crops on the Experimental Farm have never been so uniformly good as they were this year. Some of the uniform test plots of wheat, through being too heavy, lodged badly and rusted, and were considerably injured, especially in the sample. All field crops, whether grain or roots, were good both in yield and quality. Straw in many cases lodged badly, but chiefly from heavy rain after filling, and the returns do not seem to have been lessened, though the cost of harvesting was increased, as nearly every acre on the farm had to be cut one way.

Barley harvest commenced August 11, and everything was in stook on September 8.

EXPERIMENTS WITH WHEAT.

Thirty-four varieties of wheat were sown in uniform plots of one-twentieth acre on April 6 on fallowed land. In all cases the yield of straw was excessive and lodged badly, and the early sorts were struck by rust and injured to a great extent.

The land on which the uniform plots of wheat, oats and barley were sown was manured for roots three years ago, which no doubt was one of the causes of the excessive yield of straw on all the plots, and probably helped the rust in its work.

SPRING WHEAT—UNIFORM TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No. of days Maturing.	Length of Straw including Head.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.		Weight per measured bush. after cleaning.
				In.		In.		Lbs.	Bush.	Lbs.	Lbs.
1	Minnesota No. 163	Aug. 28	144	54	Medium	3½	Bald	6,040	46	..	61
2	Huron (Ottawa Seed)	*	......	50	Weak	4	Bearded	6,040	43	40	56
3	Haynes' Blue Stem, Minn. 169	" 31	147	51	Medium	4	Bald	5,080	43	40	61½
4	White Fife	" 31	147	51	Weak	4	"	6,800	43	20	59½
5	McKendry's Fife, Minn. 181	" 31	147	55	Medium	4½	"	7,820	43	..	59
6	Bishop	" 26	142	47	Weak	3½	"	5,740	43	..	59
7	Wellman's Fife	" 29	145	59	Medium	4½	"	4,540	43	..	56¼
8	Dawn	" 19	135	51	"	3½	"	6,700	41	40	54½
9	Percy (Ottawa Seed)	" 25	141	53	"	4	"	6,900	41	40	56
10	Australian No. 9	" 28	144	52	"	4	"	7,980	41	20	60½
11	Stanley (Ottawa Seed)	" 25	141	53	"	4¼	"	6,180	40	20	56
12	Laurel (Ottawa Seed)	" 28	144	52	Weak	4½	"	5,380	40	20	57
13	Power's Fife, Minn. 149	" 30	146	51	"	3¾	"	4,380	40	20	61½
14	Huron (Indian Head Seed)	*	.....	53	"	4	Bearded	7,800	40	..	55½
15	Laurel " "	" 29	145	52	Medium	4½	Bald	7,420	39	40	56½
16	Stanley " "	" 25	141	54	"	4½	"	5,320	38	..	55¼
17	Chester	" 26	142	52	Weak	4	"	5,320	38	..	56½
18	Preston (Ottawa Seed)	*	...	50	"	4	Bearded	6,140	37	40	57
19	Red Fife	" 29	145	50	Medium	3¾	Bald	5,740	37	40	59¼
20	Preston (Indian Head Seed)	*	......	54	"	4	Bearded	8,280	35	20	56
21	Monarch	" 30	146	53	"	4	Bald	4,900	35	..	60
22	Countess	*	......	51	Weak	4	"	7,000	33	20	53¼
23	Colorado	" 26	142	51	"	4½	Bearded	5,140	31	..	59¼
24	Clyde	*	....	56	Medium	4	Bald	6,380	30	20	51½
25	Advance	" 25	141	49	Strong	4	Bearded	7,200	30	..	54½
26	Percy (Indian Head Seed)	" 25	141	50	"	4	Bald	4,620	29	40	55
27	Pringle's Champlain	" 26	142	50	Medium	4¼	Bearded	7,520	28	..	58½
28	Red Fern	" 27	143	52	"	4½	"	6,740	27	40	58
29	Herisson Bearded	" 27	143	50	"	2½	"	7,600	26	40	59
30	Riga	" 19	135	52	"	3½	Bald	5,040	24	20	50
31	Downy Riga	" 19	135	47	Weak	3	"	4,720	23	40	50
32	Weldon	" 27	143	54	Medium	4¼	"	4,800	23	20	50
33	Early Riga	" 19	135	48	"	3½	"	4,140	20	..	50
34	Hungarian White	*	....	51	Strong	4	Bearded	8,700	16	40	57½

* These varieties were not fully ripe when cut, but were cut on account of being badly affected with rust. Number of days from sowing to cutting, 135.

WHEAT—TEST OF VARIETIES IN FIELD LOTS.

Nine varieties of wheat were sown in field lots, on fallowed land, clay loam, at the rate of 1½ bushels seed per acre. Huron and Preston, sown alongside each other, gave the best yields this year. Huron was almost entirely lodged, and alongside of a hedge was rusted slightly. Percy and Stanley were injured by winds in the spring to some extent, causing the yields to be below what they otherwise would have been. Preston was ripe 9 days earlier than Red Fife, which was sown one day earlier in April.

WHEAT—TEST OF VARIETIES IN FIELD LOTS.

Name of Variety.	Size of Plot.	Date of Ripening.	No. of Days Maturing.	Length of Head.	Kind of Head.	Yield per Acre.		Weight per measured bushel after cleaning.	Rusted.
	Acres.			In.		Bus.	Lbs.	Lbs.	
Huron	5	Aug. 23.	140	3½	Bearded	47	12	62	Considerably on leaves.
Preston	10	" 21.	139	4	"	46	54	62½	" "
Laurel	5¼	Sept. 1.	151	3½	Bald	42	26	57½	Slightly on leaves.
Red Fife	5½	" 1.	151	3¼	"	42	3	61	" "
White Fife	4¾	" 1.	150	3½	"	37	35	59½	Badly "
Percy	5¼	" 22.	141	3½	"	32	53	59	Slightly "
Riga	¼	" 19.	135	3	"	32	..	60	Badly "
Early Riga	¾	" 20.	138	3	"	31	50	60	Considerably on leaves.
Stanley	5¼	" 22.	141	3¼	"	31	4	59	Slightly on leaves.
Pringle's Champlain	2	" 29.	147	4½	Bearded	28	28	62	Considerably on leaves.

WHEAT CROP AND AVERAGE YIELD.

Variety.	Cultivation.	Acres.	Yield per Acre.		Total Yield.	
			Bush.	Lbs.	Bush.	Lbs.
Huron	Fallow	5	47	12	236	..
Preston	"	10	46	54	469	..
Laurel	"	5¼	42	26	222	46
Red Fife	"	5½	42	3	231	16
White Fife	"	4¾	37	35	178	31
Percy	"	5¼	32	53	172	38
Riga	"	¼	32	..	8	..
Early Riga	"	¾	31	50	23	52
Stanley	"	5¼	31	4	163	6
Pringle's Champlain	"	2	28	28	56	56
		44			1,762	5

An average of 40 bushels 3 lbs. per acre.

COMPARISON OF FIELD LOTS OF WHEAT FOR THE LAST FIVE YEARS.

Below will be found dates of seeding and ripening, number of days maturing, and yield of Red Fife and four of the early cross-bred wheats for 1905, and also the averages for the last five years. The five varieties have been grown each year in field lots, under the same conditions, except that the seeding could not in all cases be done on the same day.

Variety.	1905.					Average No. of days to mature.	Days less than Red Fife.	Average yield	
	Date sown.	Date ripe.	Days to mature.	Yield.					
				Bus.	Lbs.			Bus.	Lbs.
Red Fife	April 3	Sept. 1	151	42	3	135·6	....	40	47
Preston (Red Fife × Ladoga)	" 4	Aug. 21	139	46	54	125·4	10·2	39	32
Stanley " "	" 3	" 22	141	31	4	125·	10·6	36	17
Percy (White Fife × Ladoga)	" 3	" 22	141	32	53	127·8	7·8	32	40
Huron " "	" 5	" 23	140	47	12	123·4	12·2	42	56

SPRING WHEAT—TEST OF FERTILIZERS.

Six plots of 1-40th acre each were sown with Red Fife wheat on May 2, with hoe drill, at the rate of 1½ bushels per acre. Soil clay loam.

Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Weight of Straw.	Yield per Acre.		Rusted.
			In.		In.	Lbs.	Bush.	Lbs.	
Plot No. 1—Nitrate of soda, 100 lbs. per acre (half sown when grain was 2 in. high, balance when 6 in. high)	Sept. 4.	125	55	Medium	4	6,280	42	..	Considerably.
Plot No. 2—Nitrate of soda, 200 lbs. per acre (half sown when grain was 2 in. high, balance when 6 in. high)	" 4.	125	48	" .	4	5,400	43	20	"
Plot No. 3—Superphosphate No. 1, 400 lbs. per acre (sown before grain and harrowed)	" 4.	125	52	" .	4¼	6,920	38	..	"
Plot No. 4—Check plot, unfertilized	" 4.	125	48	" .	4	7,240	42	40	"
Plot No. 5—Muriate of potash, 200 lbs. per acre (sown before grain and harrowed)	" 3.	124	49	Weak...	4	4,760	47	20	"
Plot No. 6—Superphosphate No. 1, 200 lbs. per acre; muriate of potash, 100 lbs. per acre; nitrate of soda, 100 lbs. per acre (half sown before grain and harrowed, balance when the grain was 2 in. high)	" 3.	124	54	" ...	4¼	5,840	42	40	"

MACARONI WHEAT—TEST OF VARIETIES.

Four varieties were sown April 6, in 1-20th acre plots on fallowed land, clay loam. All were badly lodged from heavy growth of straw.

Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.		Weight per Bushel.	Rusted.
			In.		In.		Lbs.	Bush.	Lbs.	Lbs.	
1 Goose	Aug. 28	144	53	Weak...	3¼	Bearded	10,440	54	40	64¾	Considerably on leaves.
2 Yellow Gharnovka	" 28	144	55	" ..	3	"	10,140	52	..	64	"
3 Mahmoudi	" 28	144	54	" ..	3	"	8,360	51	20	63	"
4 Roumanian	" 26	142	54	" ..	3	"	8,000	45	40	63	"

EMMER AND SPELT.

Two varieties of spelt and two of emmer were sown April 8, by hoe drill on fallowed land, clay loam. Plots were 1-20th acre each. One acre of Common emmer, and two small plots of White spelt were also sown, the results being shown below:—

Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.	Weight per Bushel.
			In.		In.		Lbs.	Lbs.	Lbs.
1 Red Spelt	Aug. 28	142	51	Medium	4⅛	Bald....	5,380	3,420	38
2 White Spelt	" 28	142	55	Strong..	6	" ...	4,260	3,340	34
3 Red Emmer	" 30	144	51	Weak...	4	Bearded	5,560	3,040	40½
4 Common Emmer	" 28	142	50	" ..	3½	"	4,460	2,940	48
Common Emmer	" 29	125	51	" ..	2¼	"	.....	3,124	
White Spelt	" 29	122	50	Strong..	5½	Bald....	.....	2,435	
" "	" 28	121	60	" ..	6	" ...	......	2,344	

SUMMER FALLOWS.

In view of the great importance of properly preparing land for crops, and of the large number of new settlers coming into the country, I make no excuse for repeating what was said in my last three reports respecting summer-fallows, and breaking up and cultivating new prairie land.

It is very gratifying to know that throughout the Territories, summer-fallowing is rapidly becoming general. No matter where farming is carried on, the farmers realize that to be sure of a crop they must prepare a portion of their land the year before the crop is grown, and apart from the value of the stored moisture, there is the inestimable advantage of keeping weeds from overrunning the farm.

The true worth of properly prepared fallows has been clearly demonstrated in past years in every grain-growing district of Assiniboia.

The work of preparing land for crop by fallowing is carried on in so many ways in different parts of the Territories, that perhaps a few words on some of the methods employed may be of help to at least some of the new settlers.

It has been observed in Alberta and Saskatchewan that the land to be fallowed is not, as a rule, touched until the weeds are full grown and in many cases, bearing fully matured seed. It is then ploughed.

By this method, which, no doubt, saves work at the time, the very object of a summer-fallow is defeated. In the first place, moisture is not conserved because the land has been pumped dry by the heavy growth of weeds; and, secondly, instead of using the summer-fallow as a means of eradicating weeds, a foundation is laid for years of labour and expense by the myriads of foul seeds turned under.

The endless fields of yellow-flowered weeds, generally Ball Mustard (*Neslia paniculata*), testify to the indifferent work done in many districts, and, while no weed is more easily eradicated by a good system of fallows, there is no weed that is more easily propagated or takes greater advantage of poor work on fallows or of fall or spring cultivation.

As has been pointed out in my previous reports, early and thorough work on fallows is absolutely necessary to success, and I here repeat the methods and results of tests carried on for some years past.

First Method.—Ploughed deep (6 to 8 inches) before last of June; surface cultivated during the growing season, and just before or immediately after harvest ploughed 5 or 6 inches deep.

Result.—Too much late growth if season was at all wet; grain late in ripening, and a large crop of weeds if the grain was in any way injured by winds.

Second Method.—Ploughed shallow (3 inches deep) before the last of June; surface cultivated during the growing season, and ploughed shallow (3 to 4 inches deep) in the autumn.

Result.—Poor crop in a dry year; medium crop in a wet year. Not sufficiently stirred to enable soil to retain the moisture.

Third Method.—Ploughed shallow (3 inches) before the last of June; surface cultivated during the growing season, and ploughed deep (7 to 8 inches) in the autumn.

Result.—Soil too loose and does not retain moisture. Crop light and weedy in a dry year.

Fourth Method.—Ploughed deep (7 to 8 inches) before the last of June; surface cultivated during the growing season.

Result.—Sufficient moisture conserved for a dry year, and not too much for a wet one. Few or no weeds, as all the seeds near the surface have germinated and been killed. Surface soil apt to blow more readily than when either of the other methods is followed. For the past fourteen years, the best, safest and cleanest grain has been grown on fallow worked in this way, and the method is therefore recommended.

Fallows that have been ploughed for the first time after the first of July, and especially after July 15, have never given good results; and the plan too frequently followed of waiting till weeds are full grown, and often ripe, and ploughing under with the idea of enriching the soil, is a method that cannot be too earnestly advised against.

In the first place, after the rains are over in June or early in July, as they usually are, no amount of work, whether deep or shallow ploughing, or surface cultivation, can put moisture in the soil. The rain must fall on the first ploughing and be conserved by surface cultivation.

Weeds, when allowed to attain their full growth, take from the soil all the moisture put there by the June rains, and ploughing under weeds with their seeds ripe or nearly so, is adding a thousand-fold to the myriads already in the soil, and does not materially enrich the land.

METHODS OF PREPARING NEW GROUND.

In view of the fact that every year brings to the Territories many new settlers, who are unacquainted with the methods of breaking up and preparing new land for crop, a few suggestions with regard to this very important work may not be amiss.

In all sections where the sod is thick and tough, breaking and back-setting should be done; while in districts where scrub abounds and the sod is thin, deep breaking is all that is necessary.

The former is generally applicable to Assiniboia, and the latter to Alberta and Saskatchewan, especially to the northern parts of these Territories where the land is more or less scrubby.

SHALLOW-BREAKING AND BACK-SETTING.

The sod should be turned over as thin as possible, and for this purpose a walking plough with a 12 or 14-inch share, is the best. When the breaking is completed (which should not be later than the second week in July), rolling will hasten the rotting process and permit back-setting to commence early in August.

Back-setting is merely turning the sod back to its original place, and at the same time bringing up two or three inches of fresh soil to cover it. The ploughing should be done in the same direction as the breaking and the same width of furrow turned. Two inches below the breaking is considered deep enough, but three to four inches will give better results.

After back-setting, the soil cannot be made too fine, and the use of disc or Randall harrow to cut up every piece of unrotted sod, will complete the work.

DEEP BREAKING.

Deep breaking, which in many sections of the country is the only practicable way of preparing new land, and which is, unfortunately, done in some instances where breaking and back-setting would give more satisfactory results, consists in the turning over of the sod as deeply as possible, usually from four to five inches.

When the sod has rotted, the top soil should be worked and made as fine as possible. The use of harrow and disc will fill up all irregularities on the surface, and make a fine, even seed-bed.

Whether the land is broken shallow or deep, it is necessary to have the work completed early, so as to take advantage of the rains which usually come during June or early in July. These rains cause the sod to rot, and without them, or if the ploughing is done after they are over, the sod remains in the same condition as when turned, and no amount of work will make up for the loss.

To some districts near the foot-hills of the mountains and in districts where scrub abounds and the sod is thin, these remarks may not apply; but as a rule, throughout the Territories, early breaking, whether deep or shallow, is advisable.

WORKING LAND AFTER FIRST CROP.

Inquiries are often made as to what should be done after taking off the first crop on new land, the question being as to whether the land should be ploughed, or cultivated, or sown without any cultivation whatever.

This, however, can only be determined by circumstances. In districts with heavy clay soil, a satisfactory crop may be expected from burning the stubble of the former crop and sowing with or without cultivation, although a shallow cultivation after the stubble is burnt usually gives the best results.

In districts with light soils and especially with gravelly subsoil, cultivation before seeding is necessary.

After taking the second crop from breaking or back-setting, there can be no doubt that the land should be well fallowed to put it in proper condition for succeeding crops. If the fallow is well made and the process repeated every third year, the settler will have started on the right road to future success.

SMUT.

Smut the past season has been bad in many sections of the country, causing serious loss to the growers. Several reasons may be given why smut was so prevalent, but without a doubt the chief one was improper treatment of the seed. That smut can be entirely prevented has been time and again proven. Care must be taken to dissolve the bluestone before applying, and to have the solution strong enough.

I repeat what was said in my last report in regard to treatment for prevention of smut.

On account of many new settlers coming into the country each year that can have no idea of the prevalence of smut, especially in the wheat crop, and the serious loss caused by this fungous disease, I submit the results obtained during the past years on this farm for their guidance.

Bunt or stinking smut in wheat is a fungous disease that attacks the grain more or less each year, and where at all bad, the crop is rendered unsaleable, and with only a few heads affected, if threshed in damp weather, the grade and price are reduced. No district is proof against smut, and though more prevalent in some seasons than others, it is wise to guard against all danger from this source each year. Two remedies have been tried repeatedly; these are, treating the seed with bluestone (Copper Sulphate), and with formalin. Bluestone, from cheapness, ease in application and effectual cure, has proven the best for wheat, while formalin has given the best results with smut in oats and barley. While formalin is not more expensive than bluestone, the application is more difficult in the seed having to be soaked longer.

For wheat apparently free from smut, 1 pound of bluestone crushed and dissolved in warm water and mixed with 10 gallons water, and the seed sprinkled with, or dipped in the solution, is sufficient for 10 bushels. For wheat at all affected, 1 pound bluestone to 5 bushels seed is required. The seed can be sprinkled or dipped as is most convenient, but, in sprinkling, care must be taken that every grain is wet with the solution.

For smut in oats or barley, 1 pound of formalin (which is a liquid), is sufficient for 50 bushels seed. If the seed is smutty the solution should be 8 or 9 ounces formalin to 10 gallons of water; if not smutty, 4½ ounces to the same quantity of water.

The seed should be soaked from 5 minutes to 2 hours, according to condition of grain and strength of solution.

EXPERIMENTS WITH OATS.

Forty-one varieties were sown on April 26, on 1-20th acre plots of fallowed land. Soil, clay loam. They were sown by hoe drill, at the rate of 2 bushels seed per acre.

All sorts were very heavy and badly lodged, and had to be cut with a mower; all, however, were well advanced when heavy rains and wind lodged them, and both yield and sample were good.

OATS—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw, including head. In.	Character of Straw.	Length of Head. In.	Kind of Head.	Weight of Straw. Lbs.	Yield per Acre. Bush.	Yield per Acre. Lbs.	Weight per measured bushel after cleaning. Lbs.	Rusted.
1	Goldfinder	Aug. 26	122	53	Weak	9	Branching	6,200	117	22	39	Considerably on leaves.
2	Pioneer	" 28	124	59	"	11	"	6,160	112	32	40	
3	Siberian	" 24	120	62	Medium	12	Sided	7,200	111	26	39½	" "
4	Joanette	" 28	124	54	"	10	Branching	7,940	111	26	36½	" "
5	Golden Tartarian	" 26	122	52	Weak	10	Sided	7,020	111	6	38	" "
6	Twentieth Century	" 20	116	52	"	10	Branching	4,440	110	20	41	" "
7	Columbus	" 25	121	50	"	9	"	7,240	110	20	40	" "
8	Golden Beauty	" 26	122	51	"	10	"	7,240	110	20	41	" "
9	American Triumph	" 23	119	50	"	9	"	6,260	110	..	41	" "
10	Tartar King	" 23	119	50	"	9	Sided	5,660	110	..	42	" "
11	Early Golden Prolific	" 26	122	54	"	11	Branching	7,280	109	14	41	" "
12	Kendal White	" 23	119	56	"	9	"	7,300	108	28	41½	" "
13	Scotch Potato	" 23	119	54	Medium	10	"	7,160	107	2	40	" "
14	Mennonite	" 20	116	50	Weak	9	"	6,380	106	16	39½	" "
15	Improved American	" 24	120	52	"	9	"	6,220	105	10	42½	" "
16	White Giant	" 22	118	54	Medium	9	"	5,840	104	24	42	" "
17	Golden Giant	" 28	124	56	"	10	Sided	7,840	104	24	37	" "
18	Danish Island	" 20	116	55	Weak	10	Branching	5,840	104	24	42½	" "
19	Lincoln	" 24	120	54	"	10	"	5,920	102	12	41½	" "
20	Milford White	" 24	120	52	"	10	Sided	8,120	102	12	41½	" "
21	Holstein Prolific	" 21	117	50	Medium	10	Branching	6,740	101	26	40½	" "
22	Golden Fleece	" 27	123	50	Weak	9	"	8,140	101	6	40	" "
23	Waverley	" 22	118	52	"	10	"	6,960	101	6	42	" "
24	American Beauty	" 24	120	50	"	8	"	7,160	101	6	40	" "
25	Buckbee's Illinois	" 20	116	54	"	9	"	6,960	101	6	41	" "
26	Improved Ligowo	" 20	116	57	"	9	"	5,360	101	6	42	" "
27	Bavarian	" 21	117	57	"	8	"	7,400	100	..	38½	" "
28	Storm King	" 22	118	53	"	11	Sided	5,820	99	14	38	" "
29	Wide Awake	" 20	116	56	Medium	8	Branching	5,620	99	14	39½	" "
30	Irish Victor	" 24	120	56	Weak	10	"	6,860	98	8	42¼	" "
31	Abundance	" 21	117	53	Medium	9	"	5,440	95	30	40	" "
32	Banner	" 20	116	55	Weak	10	"	5,960	95	10	40	" "
33	Swedish Select	" 20	116	54	"	9	"	5,980	94	24	40½	" "
34	Olive Black	" 28	124	57	Medium	12	Sided	8,460	92	12	36¼	" "
35	Kirsche	" 26	122	52	"	9	Branching	7,740	90	..	39½	" "
36	Baxter's July	" 8	104	60	Weak	10	"	7,540	90	..	40	Slightly on leaves.
37	Kendal Black	" 28	124	57	Medium	10	Sided	6,560	89	14	40	Considerably on leaves.
38	Milford Black	" 28	124	55	"	10	"	7,320	84	24	37	
39	Sensation	" 20	116	53	Weak	10	"	6,400	82	12	41	" "
40	Black Beauty	" 28	124	56	"	13	Branching	5,660	74	24	36	" "
41	Thousand Dollar	" 19	115	54	Medium	11	"	5,900	73	18	41½	" "

The Baxter's July oat was received in the spring of 1905, from B. J. Baxter, Pense, Sask., under that name. This sort was cut on August 8, while the earliest other variety was cut August 20. The straw was very weak, but in ordinary years it may be much stiffer. The yield was 90 bushels per acre, and on account of earliness this variety is worthy of further trial.

EXPERIMENTS WITH OATS IN FIELD LOTS.

Twelve varieties were sown April 24 to 28, in field lots, on clay loam, and all gave good yields and good samples. Banner again heads the list for the best yield. All the varieties were more or less down, but there was no rust worth mentioning.

OATS—TEST OF VARIETIES IN FIELD LOTS.

Name of Variety.	Size of Plot.	Date of Ripening.		No. of Days Maturing.	Length of Straw including Head.	Character of Straw.	Length of Head.	Kind of Head.	Yield per Acre.		Weight per measured bushel after cleaning.
	Acres.				Inches.		In.		Bush.	Lbs.	Lbs.
Banner	10	Aug.	20	118	60	Medium	10	Branching	107	13	41
Danish Island	5	"	19	113	56	Strong	10	"	99	20	42½
White Giant	5	"	19	116	51	"	10	"	98	6	41½
Goldfinder	3	"	18	114	58	Weak	10	"	94	30	38
Improved Ligowo	5	"	19	116	55	Medium	10	"	90	28	41
Abundance	5	"	27	124	50	Strong	9	"	89	..	40
Wide Awake	5	"	18	115	55	"	10	"	89	..	43½
Thousand Dollar	2¾	"	18	112	52	Medium	9	"	89	..	44
Waverley	2¾	"	18	112	54	Strong	9	"	87	23	42½
Welcome	4	"	18	115	52	Weak	9	"	86	..	39
Tartar King	3½	"	18	114	60	Medium	9	Sided	84	28	41
Black Beauty	3	"	18	114	54	Weak	10	Branching	84	..	38½

OAT CROP AND AVERAGE YIELD.

Variety.	Cultivation.	Acres.	Yield per Acre.		Total Yield.	
			Bush.	Lbs.	Bush.	Lbs.
Banner	Fallow	10	107	13	1,073	28
Danish Island	"	5	99	20	497	32
White Giant	"	5	98	6	490	30
Goldfinder	"	3	94	30	284	22
Improved Ligowo	"	5	90	28	454	4
Abundance	"	5	89	..	445	..
Wide Awake	"	5	89	..	445	..
Thousand Dollar	"	2¾	89	..	244	25
Waverley	"	2¾	87	23	241	4
Welcome	"	4	86	..	344	..
Tartar King	"	3½	84	28	296	30
Black Beauty	"	3	84	..	252	..
		54			5,070	5

An average of 93 bushels 30 lbs. per acre.

FIELD LOTS OF OATS.

COMPARISON OF NINE VARIETIES FOR FIVE YEARS.

Following are given the average number of days maturing and average yield for the last five years of nine varieties of oats, grown in field lots under similar conditions. They were sown each year on fallowed land.

Variety.	Average time maturing for 5 years.	Average yield for 5 years.	
	Days.	Bush.	Lbs.
Banner	111·2	103	7
Abundance	114·	95	12
Wide Awake	111·4	91	..
Goldfinder	115·6	90	19
Black Beauty	112·6	88	4
Tartar King	109·6	86	5
Waverley	112·	83	5
Thousand Dollar	111·8	82	2
Improved Ligowo	112·2	82	2

EXPERIMENTS WITH BARLEY.

Fifteen varieties of two-rowed and 19 of six-rowed barley were sown on one-twentieth acre plots clay loam on April 27 to 29, with hoe drill, at the rate of two bushels of seed per acre. All gave good returns, with bright, plump samples. Some plots had to be cut with the mower, and all were badly lodged.

Barley Two-rowed—Test of Varieties.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw, including head.	Character of Straw.	Length of Head.	Weight of Straw.	Yield per Acre.		Weight per measured bushel after cleaning.
				In.		In.	Lbs.	Bush.	Lbs.	Lbs.
1	Beaver	Aug. 14	107	46	Medium	4	4,660	75	..	53½
2	Invincible	" 17	110	46	"	3	5,820	74	28	54
3	Gordon	" 13	108	51	"	3	3,300	64	28	52½
4	Standwell	" 18	111	48	"	2½	6,220	62	4	53½
5	Swedish Chevalier	" 18	111	43	"	3½	5,340	59	28	54
6	Newton	" 19	112	49	"	3	5,660	57	4	53¼
7	Danish Chevalier	" 18	111	40	"	3¼	6,140	55	20	52½
8	Canadian Thorpe	" 13	106	48	Weak	3	5,160	55	..	52½
9	Clifford	" 14	107	48	"	4	4,520	51	32	53
10	Sidney	" 14	109	47	"	4	4,340	51	12	54
11	French Chevalier	" 15	108	44	"	3¼	4,000	50	20	53
12	Jarvis	" 14	109	50	Medium	4	4,000	50	..	53
13	Logan	" 14	109	48	Weak	3½	3,700	47	44	52½
14	Harvey	" 13	106	46	Medium	3¼	3,920	47	24	53
15	Dunham	" 14	107	50	Weak	3	4,000	41	32	54

BARLEY SIX-ROWED—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw including head.	Character of Straw.	Length of Head.	Weight of Straw.	Yield per Acre.		Weight per measured bushel after cleaning.
				In.		In.	Lbs.	Bush.	Lbs.	Lbs.
1	Stella	Aug. 15..	108	43	Medium....	2	4,220	82	44	53½
2	Nugent	" 15..	108	45	"	3	5,020	78	36	51
3	Claude	" 14..	107	45	"	2½	4,640	74	8	50½
4	Blue Longhead	" 15..	108	43	" ...	2½	3,860	73	36	47
5	Yale	" 16..	109	43	"	2½	3,880	73	16	51
6	Mansfield	" 12..	105	46	"	2	6,040	70	..	53
7	Mensury	" 12..	105	50	Strong......	3	7,080	69	8	52
8	Common	" 11..	104	42	Weak	2	5,660	65	20	54
9	Rennie's Improved	" 10..	103	43	Medium....	2½	6,360	63	16	54
10	Summit	" 14..	107	49	Strong......	2½	6,780	62	44	52
11	Trooper	" 13 .	106	47	Weak	3	6,000	62	24	52½
12	Empire	" 14..	107	44	Medium....	2¾	6,400	62	24	52½
13	Oderbruch	" 10..	103	44	Weak	2½	6,200	62	24	54½
14	Odessa	" 16..	109	44	Medium....	2¼	6,420	62	4	52½
15	Argyle	" 12..	105	49	"	2¼	7,020	62	4	53
16	Brome	" 16..	109	45	Weak	3	7,060	61	12	51½
17	Royal	" 10..	103	45	"	2¼	6,080	60	40	53
18	Albert	" 14..	107	45	Medium....	2¾	5,840	57	24	54½
19	Champion	" 7..	100	43	Weak	2¾	5,260	36	12	48

FIELD LOTS OF BARLEY.

Nine varieties of barley were sown in field lots. Nearly all the yields were above the average, and all the varieties gave a good sample. Mensury was sown on Brome Grass sod, broken and back-set the previous year, and Canadian Thorpe was put in on land which gave a root crop in 1904. Sidney was sown on fallow, and also on Brome sod. The other kinds were all on fallow. All were sown on clay loam.

BARLEY—TEST OF VARIETIES IN FIELD LOTS.

Name of Variety.	Size of Plot.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Length of Straw, includ'g head	Character of Straw.	Length of Head.	Kind of Head.	Yield per Acre.		Weight per measured bushel after cleaning.
	Acres				In.		In.		Bush.	Lbs.	Lbs.
Odessa	3	April 29	Aug. 13	106	55	Weak	3	Six-rowed ..	73	34	51
Claude	3½	" 27	" 13	108	48	Medium ..	3	" ..	72	22	49
Mansfield	5	" 26	" 12	108	50	Strong ...	2½	" ..	70	45	51½
Standwell	4	May 1	" 24	115	50	Weak ...	3½	Two-rowed..	61	40	52
Mensury	5	" 1	" 12	103	52	Strong ...	3¼	Six-rowed ..	62	18	50½
Royal	1¾	April 29	" 11	104	47	Weak	3	" ..	59	42	52
Invincible	3½	May 1	" 24	115	48	Medium..	3½	Two-rowed..	57	6	53¼
Sidney	2¼	" 1	" 17	108	45	" ..	4¼	" ..	56	15	53½
Canadian Thorpe	5	" 2	" 17	107	48	Strong ...	3	" ..	54	18	53
Sidney	2	" 1	" 17	108	43	" ...	4	" ..	46	2	53½

Banner Oats in Stook, Experimental Farm, Indian Head, Sask.

Photo. by C. E. Saunders.

BARLEY CROP AND AVERAGE YIELD.

Variety.	Cultivation.	Acres.	Yield per Acre.		Total Yield.	
			Bush.	Lbs.	Bush.	Lbs.
Odessa	Fallow	3	73	34	221	6
Claude	"	3½	72	22	253	29
Mansfield	"	5	70	45	354	33
Standwell	"	4	64	40	259	16
Mensury	Brome-sod	5	62	18	311	42
Royal	Fallow	1¾	59	42	122	14
Invincible	"	3½	57	6	203	42
Sidney	"	2¼	56	15	126	34
Canadian Thorpe	Root land	5	54	18	271	42
Sidney	Brome-sod	2	46	2	92	4
		35			2,217	22

An average of 63 bushels 17 lbs. per acre.

FIELD LOTS OF BARLEY.

COMPARISON OF NINE VARIETIES FOR FIVE YEARS.

Following will be found the average number of days maturing and average yield for the past five years of nine varieties of barley. These were grown for the most part in field lots on fallow, but in one or two cases, where the varieties were not grown under these conditions, the yields of the uniform tests were taken, or yields of field plots grown on stubble or sod, in order to get figures for the five years.

Variety.	Average time maturing for five years	Average yield for five years.	
	Days.	Bush.	Lbs.
Claude	104·2	64	46
Royal	100·2	60	17
Odessa	100·	59	43
Mensury	99·	58	29
Mansfield	103·8	58	25
Invincible	110·	57	..
Sidney	104·2	56	8
Standwell	107·8	50	21
Canadian Thorpe	105·6	50	..

EXPERIMENTS WITH PEASE.

Thirty varieties of field pease were sown on one-twentieth acre plots, on May 2 on corn land ploughed in fall of 1904. Two bushels of small, 2½ bushels of medium and 3 bushels of large pease were sown to the acre. Soil, clay loam.

All sorts made a fine growth of straw, were well podded and ripened early.

PEASE—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Length of Pod.	Size of Pea.	Yield per Acre.		Weight per Bushel.
				In.	In.		Bush.	Lbs.	Lbs.
1	Kent	Aug. 28	118	67	2¼	Medium	70	..	63¼
2	Paragon	" 31	121	58	3	"	69	40	65
3	Chancellor	" 29	119	79	3	Small	69	20	65
4	Golden Vine	Sept. 1	122	68	2½	"	67	40	64
5	Mackay	" 1	122	55	3	Large	65	40	65
6	Pride	" 1	122	70	2	Small	64	40	64
7	Gregory	Aug. 31	121	67	3	Medium	62	..	64
8	Agnes	" 30	120	85	3	Large	61	40	63
9	Duke	" 31	121	60	3	Medium	59	40	64
10	English Grey	" 31	121	74	3¼	Large	58	20	62½
11	Victoria	" 30	120	61	3¼	Medium	58	..	64
12	Carleton	Sept. 1	122	62	3	"	58	..	64
13	White Wonder	Aug. 29	119	65	3	Large	57	40	65
14	Nelson	" 29	119	52	3	Medium	57	40	64½
15	Dan O'Rourke	" 31	121	68	2	Small	57	..	65½
16	Black Eye Marrowfat	Sept. 1	122	56	3	Large	57	..	64
17	Prince Albert	Aug. 31	121	88	2¾	Small	56	40	65
18	Archer	" 2	123	73	2¾	Medium	56	20	64
19	Macoun	" 30	120	70	3¼	"	56	20	64½
20	Picton	" 28	118	68	2¾	"	56	..	64½
21	Early Britain	" 31	121	65	2¾	Small	55	40	62½
22	Crown	" 30	120	73	2½	"	54	20	64½
23	Prussian Blue	" 30	120	56	3	Medium	53	..	64½
24	Pearl	" 1	122	70	2¾	"	52	..	63½
25	White Marrowfat	" 2	123	75	3	Large	51	..	65
26	Mummy	" 30	120	60	3	Small	51	..	65
27	Prince	" 29	119	60	3	"	48	40	54
28	Wisconsin Blue	" 2	123	57	2¾	"	47	40	65
29	Arthur	" 28	118	75	2½	Large	45	40	64½
30	German White	" 30	120	60	3	Medium	42	40	64½

GARDEN PEASE.

A test was made with sowing garden pease with grain drill alongside of the field varieties. The returns received were quite satisfactory, and show that a profitable crop can be grown. Plots were one-twentieth acre each.

PEASE—TEST OF VARIETIES.

Number.	Variety.	Yield per Acre.		Weight per measured Bushel.
		Bush.	Lbs.	Lbs.
1	Alaska	50	20	65
2	Shropshire Hero	49	10	59¾
3	Premium Gem	45	20	59¾
4	Horsford's Market Garden	44	40	59
5	Stratagem	43	40	59
6	Laxton's Charmer	43	..	58
7	Champion of England	40	..	59
8	American Wonder	39	20	60

FIELD LOTS OF PEASE.

Five varieties of pease were sown on May 3 and 4 in large plots—from 2½ acres to one-sixth acre. The soil was clay loam. They were pulled by a pea harvester attached to an ordinary mower, and were threshed by threshing machine, with entire concave removed. A considerable proportion were split in the operation.

PEASE—FIELD LOTS.

Number.	Name of Variety.	Size of Plot.	Date of Ripening.	Number of Days Maturing.	Character of Growth.	Length of Straw.	Length of Pod.	Size of Pea.	Yield per Acre.		Weight per Bushel.
		Acres.				In.	In.		Bush.	Lbs.	Lbs.
1	Dan. O'Rourke	⅓	Aug. 28	116	Strong...	62	2¼	Medium..	53	24	65
2	White Wonder......	⅚	" 28	116	" ...	80	3	Large	49	50	64
3	Golden Vine	⅙	" 29	118	" ...	63	2⅓	Small	49	..	65¼
4	Arthur	2½	" 24	113	" ...	61	2½	Large	47	50	65
5	German White....	⅙	" 29	117	" ...	65	2¾	Medium..	35	33	63

ROTATION CROPS.

The rotation tests commenced in 1899 were continued this year. Several of the half acres of grain on fallowed land were rusted. The soil was a clay loam.

Below is given a list of the plots with the different rotations of crops grown on them:—

No.	1899 and 1902.	1900 and 1903.	1901 and 1904.	1905.
1	Wheat.................	Oats..................	Soja Beans	Wheat.
2	"	Wheat..........	Pease..........	"
3	"	Oats	Tares	"
4	"	Wheat......	Red Clover............	"
5	"	Barley.................	Alsike and Alfalfa	"
6	Pease..................	Wheat.............. ...	Wheat..................	Pease.
7	Tares	"	Oats.......	Tares.
8	Soja Beans.............	"	"	Soja Beans.
9	Red Clover............	"	Wheat.................	Red Clover.
10	Alsike and Alfalfa.......	"	Barley	Alsike and Alfalfa.
11	Rape	"	Summer fallow.........	Timothy.
12	Wheat.................	"	"	Wheat.
13	"	Oats	"	"
14	"	Barley	"	"
15	"	Wheat..................	Oats.......	"
16	"	Barley	"	"
17	Oats	Soja Beans..	Wheat.................	Oats.
18	Wheat..................	Pease	"	Wheat.
19	Oats	Tares	"	Oats.
20	Wheat...........	Red Clover	"	Wheat.
21	Barley	Alsike and Alfalfa	"	Barley.
22	Rye	Summer fallow	"	Common Emmer.

Rotation test.—Results obtained in 1905. Plots ½ acre each. Soil, clay loam.

GRAIN—ROTATION TEST.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	No. of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Yield per Acre.	
					In.		In.		Bush.	Lbs.
1	Wheat, Red Fife.	April. 5..	Aug. 27..	144	52	Medium..	4	Bald......	33	20
2	" "	" 5..	" 27..	144	56	Strong ...	4	"	27	48
3	" "	" 5..	" 27..	144	54	"	3¾	"	31	24
4	" "	" 5..	– 27..	144	51	"	4	"	28	32
5	" "	" 5..	" 27..	144	51	"	3¾	"	28	54
6	Pease	May 3..			Ploughed under.					
7	Tares..................	" 3..			"	"				
8	Soja Beans	" 17..			"	"				
9	Red Clover.....	" 18..			"	"				
10	Alsike and Lucerne...	" 18..			"	"				
11	Timothy	....			"	"				
12	Wheat, Red Fife......	April 5..	Aug. 27..	144	52	Medium..	4	Bald......	34	10
13	" "	" 5..	" 27..	144	53	Strong ...	3¾	"	38	52
14	" "	" 5..	" 27..	144	52	"	4	"	32	54
15	" "	" 5..	" 27..	141	51	"	4	"	32	46
16	" "	" 5..	" 27..	144	49	"	3¼	"	18	24
17	Oats, Banner..	" 26..	" 22..	118	48	"	9	Branching	42	12
18	Wheat, Red Fife......	" 5..	" 26..	143	47	"	3	Bald	18	26
19	Oats, Banner	" 26..	" 22..	118	50	"	9	Branching	52	18
20	Wheat, Red Fife......	" 5..	" 26..	143	50	"	3	Bald .. .	23	28
21	Barley, Mensury	May 2..	" 9..	99	48	"	3½	6-rowed ..	43	28
22	Common Emmer......	" 2..	" 26..	116	48	"	3	Bearded..	1866	

EXPERIMENT WITH FALL RYE.

One-quarter acre of fallowed land was sown with fall rye on September 10, 1904. Ripe August 3. Straw was medium strength, 77 inches long. Length of head, 4½ inches. Yield per acre, 40 bushels; weight per bushel, 58½ lbs. It gave a large crop of straw as well as of grain, and is well worth growing for early fodder or for grain.

EXPERIMENT WITH SPRING RYE.

Sown on one-twentieth acre plot of fallowed land, April 8. Ripe August 12; time to mature, 126 days. Straw medium; 60 inches long; weight of straw per acre, 3,000 lbs. Length of head, 3¼ inches. Yield per acre, 53 bushels, 32 lbs. Weight per measured bushel, 59 lbs. Straw was light in comparison with the winter variety, though the yield of grain was heavier.

EXPERIMENT WITH TARES.

Sown on one-twentieth acre plot of fallowed land, May 2. Ripe September 5; time to mature, 126 days. Length of straw, 50 inches; pod, 2 inches; weight of straw per acre, 3,800 lbs. Yield per acre, 59 bushels, 15 lbs., weighing 64½ lbs. per measured bushel.

EXPERIMENT WITH CANARY GRASS.

(Phalaris canariensis).

One-twentieth acre of fallowed land was sown with Canary Grass seed on May 2. Ripe August 28; time to mature, 118 days. Straw strong; length, 44 inches; heads, 1½ inches long. Weight of straw per acre, 2,340 lbs. Yield per acre, 20 bushels, 40 lbs. Standard weight of bushel, 48 lbs. Weight per measured bushel, 58 lbs.

EXPERIMENT WITH SOJA BEANS.

Sown May 17, in rows 28 inches apart, on one-twentieth acre plot of fallowed land. They were in flower when killed by frost on October 1. Yield per acre of dry fodder, 2 tons, 400 lbs. Cut, October 9.

EXPERIMENT WITH HORSE BEANS.

Sown May 17, in rows 28 inches apart, on one-twentieth acre plots of fallowed land. Height when cut on October 9, 48 inches. Weight of dry fodder per acre, 3½ tons.

EXPERIMENT WITH MILLETS.

Five varieties were sown on May 16 and 17 on one-fortieth acre plots of fallowed land. Three varieties germinated very poorly and were ploughed up. The other two plots were cut on September 12, partially ripe.

Variety.	Date Sown.	Height when Cut.	Yield per Acre Dry Fodder.	
		Inches.	Tons.	Lbs.
Moha Hungarian	May 17	38	3	92
Moha Green Californian	" 17	36	2	1,238
Cat Tail	" 16	Plowed up.	..	..
White Round French	" 16	"	..	..
Italian	" 16	"	..	..

EXPERIMENTS WITH FLAX.

Five varieties of flax were sown on one-fortieth acre plots of land, which had produced a corn crop the previous year. Sown May 16, by grain drill, at the rate of 40 lbs. per acre.

Common flax was sown on the same date at the rate of 20, 30, 40 and 50 lbs. seed per acre, one-twentieth acre of each being put in. Sown on corn land, same as the preceding test.

Common flax was sown on fallowed land on May 15, on a plot 1¼ acres in extent. Details of these tests are given below. The soil in all cases was a clay loam.

FLAX—TEST OF SOWING DIFFERENT QUANTITIES OF SEED PER ACRE.

Quantity of Seed per Acre.	Size of Plot.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Weight of Straw.	Yield per Acre.		Weight per Bushel.
	Ac.				In.		Lbs.	Bush.	Lbs.	Lbs.
20 lbs	1/20	May 16	Aug. 17	93	32	Strong	1,500	14	16	......
30 "	1/20	" 16	" 17	93	33	"	2,080	20	40	......
40 "	1/20	" 16	" 17	93	34	"	1,840	18	32	......
50 "	1/20	" 16	" 17	93	30	"	2,260	21	44	......

FLAX—TEST OF VARIETIES.

Yellow Seeded	1/40	May 16	Aug. 20	96	30	Strong	2,500	24	..	54½
Riga	1/40	" 16	" 17	93	33	"	1,840	22	48	54½
Common	1/40	" 16	" 17	93	35	"	2,000	17	8	55½
White Flowering	1/40	" 16	" 20	96	26	"	1,780	16	24	54½
Improved Russian	1/40	" 16	" 17	93	32	"	1,720	15	40	53½
Common Flax	1¼	" 15	" 17	94	36	"	....	13	24	......

HAY CROP.

While a good yield of hay was obtained from Brome and Western Rye grass the past season, it was not so heavy as in former years, from the fact that all the fields have been in hay for several years. The various sorts of Alfalfa came through the winter quite safely, and gave good yields. Red clover was half killed, the balance being left to ripen and cut for seed. Considerable Alfalfa was also cut for seed.

Meadow Fescue, sown in 1904, gave a fair return.

Kentucky Blue grass, and Orchard grass (two-thirds of which was a mixture of other sorts), gave good crops.

Alsike sown in 1904, did not stand the winter.

From the past season's tests, favourable hopes are entertained that many varieties of grasses that were all failures in the early years of the farm may yet prove successful in the future.

In May last, the Agricultural Department at Washington sent to this farm alfalfa seed for sowing, which had been obtained from the following places: Utah, Northern Montana, Southern Montana, Peru, Nebraska, New York, Turkestan, Minnesota (Grimm), and some first quality commerical seed. These were all sown in plots varying in size according to quantity of seed of each sort received. They all germinated, and made a vigorous growth during the season.

Seed of Red clover and Alfalfa, both inoculated and untreated, were sent up from the Central Experimenal Farm, Ottawa, for trial. These made a vigorous growth, and except going over them with a mower, they were not cut. The inoculated alfalfa showed a somewhat stronger growth than the untreated seed, but the two clover plots were almost equally good.

YIELDS OF HAY PER ACRE.

Brome Grass—(Bromus inermis).

Size of Plot. — Acres.	—	Yield per Acre.	
		Tons.	Lbs.
½	Sown 1899, renewed by ploughing shallow, 1904	1	1,500
4½	" 1900	..	1,440
12	" 1901	1	1,110
2¼	" 1899	..	1,762
5½	" 1900	..	1,430

Western Rye Grass—(Agropyrum tenerum).

2	Sown 1902	1	632
2	" 1901	2	1,000
⅔	" 1904	3	....

Small Plots of Clover and Grasses.

—	Sown.	Yield per Acre.			
		1st Cutting.		2nd Cutting.	
		Tons.	Lbs.	Tons.	Lbs.
Common Alfalfa	1904..	2	222	1	900
Turkestan Alfalfa	1904..	2	1,480	1	1,360
Utah Alfalfa	1904..	2	1,000	1	1,080
Meadow Fescue	1904..	1	1,000	..	....
Timothy	1902..	..	940	..	....
Orchard Grass	1904..	1	700	..	....
Kentucky Blue Grass	1904..	2	555	..	....

EXPERIMENTS WITH INDIAN CORN.

Twenty-two varieties were sown on May 19, on clay loam in drills 36 inches apart, and also in hills 3 feet apart each way. Three varieties were also sown in drills at four different distances apart.

The land was fallowed the previous year, but not manured.

The corn was cut on September 8, the yield per acre of green fodder being calculated from the weight of two rows, each 66 feet long. All the varieties made a strong growth.

After wilting slightly, the corn was cut up and put in silo. In addition to the uniform tests, five acres were sown with corn for ensilage.

INDIAN CORN—TEST OF VARIETIES.

Number.	Name of Variety.	Height.	Condition when cut.	Weight per acre grown in rows.		Weight per acre grown in hills.	
		In.		Tons.	Lbs.	Tons.	Lbs.
1	Eureka	92	Tasselled	19	1,600	15	1,900
2	Superior Fodder	84	Not tasselled	19	1,600	12	750
3	Pride of the North	90	In silk	19	500	16	1,000
4	Red Cob Ensilage	90	Not tasselled	18	850	11	550
5	Selected Leaming	86	Tasselled	18	300	12	750
6	Thoroughbred White Flint	67	Not tasselled	17	650	14	600
7	Compton's Early	80	In silk	17	650	9	150
8	Salzer's All Gold	84	Not tasselled	16	1,550	15	1,350
9	Northern Dent	90	Tasselled	16	450	12	1,300
10	North Dakota White	60	In silk	15	1,350	11	1,100
11	White Cap Yellow Dent	90	Tasselled	14	600	12	200
12	Mammoth Cuban	90	In silk	14	600	10	350
13	Champion White Pearl	92	Tasselled	14	50	12	1,300
14	Giant Prolific Ensilage	83	"	14	50	11	1,650
15	Longfellow	78	In silk	13	1,500	12	200
16	Angel of Midnight	80	"	13	950	14	50
17	King Philip	80	"	13	400	13	1,500
18	Early Mastodon	84	Early milk	13	400	11	1,650
19	Evergreen Sugar	80	In silk	12	1,850	10	900
20	Early Butler	90	Early milk	11	1,100	12	1,300
21	Cloud's Early Yellow	85	Tasselled	11	..	12	1,300
22	Compton's Early	80	Early milk	11	..	11	1,650

TEST OF SEEDING AT DIFFERENT DISTANCES.

Sown in rows by grain seeder May 19; cut September 9; all made strong growth. Cultivation of land same as for preceding test.

Name of Variety.	Distance between rows.	Height.	Weight per acre grown in rows.	
	Inches.	Inches.	Tons.	Lbs.
Longfellow	21	80	21	1,378
"	28	78	17	1,425
"	35	80	15	1,696
"	42	82	13	1,818
Selected Leaming	21	92	18	1,720
"	28	90	15	465
"	35	90	15	564
"	42	88	13	875
Champion White Pearl	21	94	13	604
"	28	96	14	340
"	35	96	13	1,168
"	42	100	13	404

ROOT CROPS.

The root crops this year of all sorts have never been surpassed since the Farm was started, yield and quality being considered. Turnips, mangels, carrots and sugar beets were all extra good.

All root seeds, including carrots, were sown with ordinary grain hoe-drill, which proved satisfactory, saving considerable labour in making drills. The yields were computed from the weight of two rows, 66 feet long and 30 inches apart.

EXPERIMENTS WITH TURNIPS.

Twenty varieties were sown, the soil was a clay loam; the first sowing was on May 17, and the second sowing on the 26th. They were all pulled on October 23.

TURNIPS—TEST OF VARIETIES.

Number.	Name of Variety.	Yield per Acre.							
		1st Plot.				2nd Plot.			
		Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
1	Halewood's Bronze Top	38	1,484	1,291	24	24	1,368	822	48
2	Carter's Elephant	34	1,168	1,152	48	23	728	778	48
3	Sutton's Champion	33	1,980	1,133	..	24	1,764	829	24
4	Hall's Westbury	32	1,868	1,097	48	34	376	1,139	36
5	Good Luck	31	1,228	1,053	48	30	324	1,005	24
6	Perfection	31	436	1,040	36	36	204	1,203	24
7	Skirving's	30	1,776	1,029	36	28	1,420	957	..
8	Emperor	30	720	1,012	..	28	628	943	48
9	Bangholm Selected	29	1,664	994	24	33	792	1,113	12
10	Magnum Bonum	29	1,400	990	..	20	128	668	48
11	Imperial	28	1,288	954	48	29	1,400	990	..
12	Kangaroo	27	1,836	930	36	26	668	877	48
13	Jumbo	26	1,196	886	36	27	1,836	930	36
14	Selected Purple Top	25	1,876	864	36	25	1,480	858	..
15	New Century	25	826	847	..	29	1,400	990	..
16	East Lothian	23	860	781	..	22	616	743	36
17	Elephant's Master	22	1,804	763	24	28	1,816	963	36
18	Drummond Purple Top	22	748	745	48	24	840	814	..
19	Hartley's Bronze	21	1,956	732	36	29	476	974	36
20	Mammoth Clyde	21	240	704	..	27	1,044	917	24

MANGELS—TEST OF VARIETIES.

Sixteen varieties were sown on clay loam. The first sowing was on May 13, and the second on May 26, and both were taken up October 9.

Number.	Name of Variety.	Yield per Acre. 1st Plot.		Yield per Acre. 1st Plot.		Yield per Acre. 2nd Plot.		Yield per Acre. 2nd Plot.	
		Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
1	Prizewinner Yellow Globe	40	124	1,335	24	25	28	833	48
2	Triumph Yellow Globe	37	1,240	1,254	..	29	476	974	36
3	Yellow Globe Selected	34	1,960	1,166	..	29	80	968	..
4	Mammoth Yellow Intermediate	34	1,828	1,163	48	24	312	805	12
5	Giant Yellow Intermediate	34	244	1,137	24	27	1,704	928	24
6	Half Sugar White	33	1,980	1,133	..	29	1,796	996	36
7	Yellow Intermediate	33	1,452	1,124	12	25	556	842	36
8	Lion Yellow Intermediate	33	396	1,106	36	28	1,420	957	..
9	Giant Sugar	32	284	1,071	24	27	252	904	12
10	Giant Yellow Globe	31	964	1,049	24	30	1,644	1,027	24
11	Prize Mammoth Long Red	29	1,004	983	24	23	596	776	36
12	Mammoth Long Red	28	1,156	952	36	29	608	976	48
13	Half Sugar Rosy	28	628	943	48	23	992	783	12
14	Selected Mammoth Long Red	27	120	902	..	22	1,936	765	36
15	Leviathan Long Red	26	404	873	24	23	1,916	798	36
16	Gate Post	25	1,348	855	48	22	220	737	..

CARROTS—TEST OF VARIETIES.

Eleven varieties were sown on clay loam on April 19; and were pulled on October 23.

Number.	Name of Variety.	Yield per Acre.		Yield per Acre.	
		Tons.	Lbs.	Bush.	Lbs.
1	Ontario Champion	25	1,744	862	24
2	New White Intermediate	24	1,368	822	48
3	Giant White Vosges	21	1,296	721	36
4	Carter's Orange Giant	20	1,448	690	48
5	White Belgian	18	36	600	36
6	Early Gem	17	1,904	598	24
7	Mammoth White Intermediate	17	584	576	24
8	Kos Kirsche	16	1,792	563	12
9	Improved Short White	16	1,264	554	24
10	Half Long Chantenay	13	1,984	466	24
11	Long Yellow Stump-rooted	10	1,648	360	48

SUGAR BEETS—TEST OF VARIETIES.

Eight varieties of sugar beets were sown on clay loam. The first sowing was made on May 13, the second on May 26 and both lots were taken up on October 21.

Number.	Name of Variety.	Yield per Acre.—1st Plot.		Yield per Acre.—1st Plot.		Yield per Acre.—2nd Plot.		Yield per Acre.—2nd Plot.	
		Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
1	Red Top Sugar	27	384	906	24	21	1,296	721	36
2	Royal Giant	27	252	904	12	23	1,368	800	48
3	Danish Improved	22	616	743	36	18	564	609	24
4	Improved Imperial	19	1,600	660	..	22	880	748	..
5	Vilmorin's Improved	16	1,396	556	36	16	228	503	48
6	Wanzleben	15	1,416	523	36	13	928	448	48
7	French Very Rich	15	888	514	48	15	1,812	530	12
8	Danish Red Top	12	1,872	431	12	24	840	814	..

EXPERIMENTS WITH POTATOES.

Forty-one varieties were under test at Indian Head in 1905. The soil was a clay loam summer-fallowed. The potatoes were planted on May 13, the sets being dropped in drills 30 inches apart. They were dug on October 3. There was no rot in any of the varieties; the yield and quality were excellent, and nearly all the tubers were marketable. While as large yields of potatoes have been grown in former years, the quality was not equal to those of this year's growth. The yield per acre has been obtained by weighing the potatoes from one row 132 feet long.

POTATOES—TEST OF VARIETIES.

	Name of Variety.	Average Size.	Total Yield per Acre.		Form and Colour.
			Bush.	Lbs.	
1	Seedling No. 7	Large	640	48	Oval, red.
2	Vermont Gold Coin	Medium	625	24	Oval, white.
3	Rochester Rose	Large	561	36	Long, red.
4	Reeve's Rose	Medium	530	48	Oval, red.
5	Carman No. 3	Large	525	12	Oval, white.
6	Late Puritan	Medium	519	48	Oval, white.
7	American Giant	Large	511	..	Long, white.
8	Uncle Sam	"	508	48	Oval, white.
9	Sabean's Elephant	"	491	12	Long, white.
10	Early St. George	Medium.	491	12	Long, red.
11	Morgan's Seedling	Large	486	48	Oval, red.
12	Burnaby Mammoth	"	484	36	Long, red.
13	Maule's Thoro'bred	Medium	484	36	Oval, pink.
14	Dreer's Standard	"	475	48	Oval, white.
15	Rose No. 9	Large	473	36	Long, red.
16	Vick's Extra Early	Medium	462	36	Oval, pink.
17	Cambridge Russet	Large	460	24	Long, russet.
18	Country Gentleman	"	458	12	Oval, red.
19	Early Envoy	"	458	12	Oval, pink.
20	American Wonder	Medium	458	12	Long, white.
21	Penn Manor	Large	453	48	Long, red.
22	Money Maker	"	451	36	Oval, white.
23	Delaware	Medium	449	24	Oval, white.
24	Empire State	Large	447	12	Oval, white.
25	I. X. L.	Medium	442	48	Long, pink.
26	Carman No. 1	"	442	48	Oval, white.
27	Everett	Large	434	..	Long, pink.
28	State of Maine	"	418	36	Oval, white.
29	Pearce	"	398	48	Long, pink.
30	Early White Prize	Small	394	24	Oval, white.
31	Holborn Abundance	Large	392	12	Oval, white.
32	Early Andes	Small	392	12	Round, pink.
33	Enormous	Large	379	..	Long, white.
34	Early Elkinah	Small	365	48	Round, red.
35	Bovee	Medium	359	12	Oval, pink.
36	Dooley	Large	354	48	Round, white.
37	Canadian Beauty	"	348	12	Oval, pink.
38	Pingree	"	337	12	Oval, white.
39	Irish Cobbler	Medium	337	12	Round, white.
40	Swiss Snowflake	"	335	..	Oval, white.
41	Early Rose	Large	308	36	Oval, red.

SUMMARY OF CROPS, 1905.

	Bushels.
Wheat:	
10 varieties, 44 acres	1,762
12 half acres, rotation test	174
40 uniform test plots	78
	2,014
Oats:	
12 varieties, 54 acres	5,070
2 half acres, rotation test	47
41 uniform test plots	206
	5,323

Barley:		
9 varieties, 35 acres	2,217	
1 half acre, rotation test	22	
34 uniform test plots	102	
	2,341	
Pease:		
5 varieties, 4 acres	193	
38 uniform test plots	117	
	310	
Flax	20	
Rye	13	
	Tons.	Lbs.
Emmer and Spelt	..	4,302
Corn, ensilage	70	
Hay:		
Brome grass	31	
Rye grass	10	
Sundry grasses	1	800
Alfalfa	2	1,200
Hay cut in coulees	25	
	70	
	Bushels.	
Roots	5,000	
Potatoes	145	

VEGETABLE GARDEN.

The tests made the past year with vegetables were on the whole very satisfactory.

Onions, carrots, beets and cabbage were sown or planted in duplicate plots. The one had vegetables the previous year, and was manured and ploughed after the vegetables were taken up. The second plot was fallowed in 1904. As will be observed, the vegetables on the fallowed plot gave the largest return.

ASPARAGUS.

There was a good crop from the old beds of asparagus; in use May 14 to July 13. The varieties grown are Barr's Mammoth, Barr's Elmira and Conover's Colossal.

BEANS—SOWN MAY 14 AND 20.

Variety.	Sown May 14.		Sown May 20.		Remarks.	Length of Pod.
	In use.	Ripe.	In use.	Ripe.		
						In.
Currie's Rust-proof	Aug. 1	Sept. 7	Aug. 14	Sept. 24	Wax	4-5
Challenge Black	" 1	" 7	" 14	" 24	"	4-5
Early Six Weeks	July 29	Aug. 30	" 7	" 24	Green	5-6
Fame of Vitry	Aug. 3	Did not ripen.	" 14	Did not ripen.	"	6-7½
Extra Early	July 29	Aug. 30	" 7	Sept. 24	"	4-5
Haricot	Aug. 1	Sept. 7	" 14	" 24	"	4-5
Emperor of Russia	" 1	" 7	" 16	Did not ripen.	"	5-6½
Golden Skinless	" 1	" 7	" 16	Sept. 24	Wax	3-4
Black Speckled	" 1	" 20	" 18	Did not ripen.	Green	4-6
Dwarf Kidney	July 29	" 7	" 14	Sept. 24	Wax	4-5

BROCCOLI.

Sown in hot-house March 31; set out May 17. Crop was a failure.

BEETS.

Sown in garden May 10, and on fallow May 16; in use July 19; pulled October 10. When thinning the rows on June 24, a number were transplanted. These beets were larger and rougher than those left where they were sown.

Variety.	Yield per Acre.				Remarks.
	First Seeding.	Transplanted.	Second Seeding.	Transplanted.	
	Bush.	Bush.	Bush.	Bush.	
Long Red Blood	690	500	429	710	
Egyptian	610	750	298	824	Fairly smooth.
Turnip Blood Red	732	715	480	880	Smooth.
Nutting's Improved	732	520	242	806	Seed badly mixed.

BRUSSELS SPROUTS.

Sown in hot-house March 31; set out May 18 ; in use September 1. Covered with sprouts of good quality.

CARROTS.

Variety.	In use.	Yield per Acre.		Remarks.
		Sown in Garden Apl. 30.	Sown on Fallow May 6.	
		Bush.	Bush.	
Early Gem	Aug. 4	520	829	Good quality.
Long Blood Red	" 6	533	630	Good quality.
Chantenay	July 29	497	533	Very good.
French Horn	" 12	605	666	Good early carrot.
Half Long Luc	" 29	701	713	Good.

The carrots were pulled on October 10.

CAULIFLOWER.

Sown in hot-house March 31; set out May 18; second seeding April 11; set out May 27.

Variety.	First Sowing in Garden.		Second Sowing on Fallow.		Remarks.
	In use.	Average Weight.	In use.	Average Weight.	
		Lbs.		Lbs.	
Snowball	July 7	5	July 20	6	Best quality.
Earliest Dwarf Erfurt	" 11	5	" 20	5½	Good.
Half Early Paris	" 18	6	" 22	6½	Good.

CABBAGE.

Sown in hot-house March 31; set out in garden May 18. Second sowing April 11; set out on fallow May 27.

Variety.	1st Seeding.		2nd Seeding.		Remarks.
	In Use.	Average Weight.	In Use.	Average Weight.	
		Lbs.		Lbs.	
Early Paris Market	July 14	5	Aug. 6	6	Good quality.
Winnigstadt Early	" 17	7	" 6	9	"
Extra Early Express	" 17	6	" 10	7	"
Early Midsummer Savoy	" 24	5	" 14	5	Poor, soft heads.
Early Jersey Wakefield	" 24	6	" 14	6	Good, solid heads.
Fottler's Drumhead	" 24	9	" 14	9	" "
Large Flat Drumhead	" 24	11	" 14	10	" "
Green Globe Savoy	" 20	7	" 12	8	Good heads.

GARDEN CORN.

Variety.	Tassel.	In Silk.	Green In Use.	Ripe.	Remarks.
Red Squaw, sown May 20	July 3	July 17	Aug. 10	Sept. 7	Small cobs.
White Squaw " 20	" 3	" 17	" 10	" 7	"
Peep o' Day " 20	" 17	" 30	" 20	" 14	Good.
Red Squaw " 28	" 12	" 22	" 15	" 8	
White Squaw " 28	" 12	" 22	" 15	" 8	
Peep o' Day " 28	" 21	Aug. 1	" 25	" 16	
Cross (Squaw and Fordhook Ey.), sown May 28	" 26	" 4	" 31	" 24	Poor cobs; grown too near hedge.
Thorndike, sown May 31	" 22	" 5	" 26	.....	Cobs good size and quality. Cut Sept. 14, but not quite ripe.

CELERY.

Five varieties were tested: White Plume, Paris Golden Yellow, Rose-ribbed Paris, Red Large-ribbed and Giant Pascal. Sown in hot-house April 2; transplanted May 4; set out June 7; White Plume in use August 20, the other varieties September 1. The celery did not grow very large, but was of good quality.

CUCUMBERS.

Sown April 20 in hot-house; set out May 23.

——	Average length.	Remarks.
Early White Spine, in use from Aug. 11, until Sept. 25	6 in.	Good crop.
Cumberland " " 20 " " 25	8 "	"
Long Green " " 24 " " 25	8 "	"

The young plants were frozen back on June 24, and took 3 weeks to recover.

CITRONS.

Red Seeded citron was sown in hot-house April 20; set out May 23; killed by frost June 24. Also sown in open June 24; a little fruit ripened September 30, averaging only 3 inches in diameter.

LETTUCE.

Variety.	1st Sowing.	In Use.	Remarks.
All the year round	April 20	June 5	Fair.
Red Edged Victoria	" 20	" 5	"
Brown Stonehead	" 20	" 1	Very good.
Neapolitan	" 20	May 29	Best of all.
Trocadero	" 20	June 5	Fair.
Tom Thumb	" 20	" 5	Small, solid heads.
Cos, Trianon	" 20	" 5	Solid, coarse.
Cos, Green Paris	" 20	" 5	" "

Second seeding May 13; in use June 24. Third seeding June 10; in use July 18. Fourth seeding July 14; in use September 1. Fifth seeding July 29; in use September 24.

MELONS.

Musk melon—Hamilton Market and New Garden Lemon, and Water melon—Phinney's Early were sown in hot-house April 20; set out May 23; injured by frost, June 24.

They were also sown in open on June 2. Hamilton Market ripened three melons of fair quality on September 16; the other sorts did not mature.

ONIONS.

Sown in open, April 30; pulled September 22.

Variety.	Size.	Yield per Acre.	Remarks.
		Bushels.	
Large Red Wethersfield	Large	266	Firm, good quality.
Silverskin	"	254	Rough, good for summer use.
Market Favorite	Medium	157	Fair quality.
Yellow Globe Danvers	"	145	Good.
Trebon's Large Yellow	Small	90	Did not mature properly.

Sown in open, May 6; pulled September 22.

Variety.	Size.	Yield per Acre.	Remarks.
Yellow Globe Danvers	Large	242	These would have yielded better, but high wind covered seed too deeply with drifting soil.
Trebon's Large Yellow	"	229	
Silverskin	"	223	
Large Red Wethersfield	Medium	175	
Market Favorite	Large	157	

Sown in hot-house, April 2; set out May 6; pulled September 22. Mixed seed.

Variety.	Size.	Yield per Acre.	Remarks.
Mixed seed	Very large	205	Very fine quality.

PARSNIPS.

Sown May 10; in use September 10.

Manitoba Prize Intermediate, 774 bushels per acre; solid, good quality. Hollow Crown, 484 bushels per acre; fair quality.

PARSLEY.

Moss Curled and Triple Curled, sown May 17; in use July 19. Made a fine growth.

PEPPERS.

Large Red Pepper. Sown in hot-house April 1; set out June 3. Pods about 4 inches long, but did not ripen.

PUMPKINS.

Large Yellow Field Pumpkin, sown in hot-house April 20; set out May 23; first ripe September 12. A good crop of fair sized pumpkins.

Mensury Barley in Stook, Experimental Farm, Indian Head, Sask.

Photo by C. E. Saunders.

GARDEN PEASE.

Sown May 5 and May 16. Each lot did well.

Name.	Size.	In use.	Ripe.	Remarks.
Admiral	Small	July 26	Aug. 22	
Alaska	″	″ 14	″ 18	
American Wonder	Medium	Aug. 2	″ 24	Best medium.
Anticipation	Large	″ 2	″ 28	Very good.
Burpee's Profusion	″	″ 2	Sept. 2	
Extra Early	Medium	July 14	Aug. 16	
Everbearing	″	Aug. 2	″ 26	
First of All	″	July 12	″ 16	Good early pea.
First and Best	″	″ 20	″ 24	
Champion of England	″	Aug. 6	″ 28	
Harrison's Glory	″	″ 6	Sept. 1	
Horsford's Market Garden	Small	″ 6	Aug. 28	
Laxton's Charmer	Medium	″ 8	Sept. 1	
Nott's Excelsior	″	July 21	Aug. 18	Good quality.
Premium Gem	″	″ 31	Sept. 1	
Rural New Yorker	Small	″ 17	Aug. 16	
Surprise	″	″ 14	″ 16	Best early pea.
Stratagem	Very large	Aug. 8	″ 30	Best all round pea.
Shropshire Hero	Medium	July 30	″ 28	Poor crop.
Wm. Hurst	Small	″ 21	″ 21	One of the earliest.
Yorkshire Hero	Medium	Aug. 6	Sept. 1	Extra good.

RADISH.

Five sowings of radishes were made, on April 30, May 9, May 28, June 24 and July 29. The first seeding grew too slowly, and the radishes were hot and stringy. The last seeding was too late. Following are results from other three seedings:—

Variety.	2nd Seeding. In use.	3rd Seeding. In use.	4th Seeding. In use.	Remarks.
Early Turnip Scarlet	June 12	June 28	July 21	Good quality.
Deep Scarlet	″ 12	*	″ 23	Fair quality.
Olive Scarlet	″ 14	*	″ 23	Very tender and crisp.
Olive White-tipped	″ 14	June 30	″ 23	″ ″
Early Scarlet White-tipped	″ 12	*	″ 23	Good.

*Not sown at third seeding.

WINTER RADISH.

Sown July 10 and 29; pulled October 20. Second sowing too late, and did not come to much.

Black Spanish, very large, but of poor quality.

Scarlet China, large and of good quality.

SAGE.

Sown May 17; in use July 15; pulled September 12; very good.

SAVORY.

Sown May 17; in use July 15; pulled October 20; fair.

SPINACH.

Bloomsdale and Victoria, sown May 17; in use July 12; quality good.

TOBACCO.

Six varieties were sown in hot-house, April 3; transplanted to garden, June 3.

Name.	In Bloom.	First fit to pull.
Connecticut	July 1	August 25
Small Red Canadian	" 6	" 22
Cannelle	" 1	" 20
White Burley	" 1	" 12
Primus	" 8	" 22
Zimmer's Special	" 3	" 16

All varieties did well.

TOMATOES.

Sown in hot-house, April 3; set out May 28 in three plots: '1' on fallow; '2' in a garden plot, and '3' in garden rather too close to a tall hedge, which caused a great reduction in the yield, though on the north of the plants. The plants were put out three feet apart, the rows also were three feet apart. All tomatoes which had not ripened by September 15 were pulled on that date for use in pickling.

Variety.	First Ripe.	Number of Plants.	Yield.	Colour and Quality.
Plot 1—				
Earliest of All	Sept. 8	20	5 bush.	Scarlet, good, large, but rather rough.
Plentiful	" 11	20	2½ "	Pink, fine and smooth.
Plot 2—				
Earliest of All	Did not ripen	17	3 "	
Plot 3—				
Earliest of All	Sept. 8	10	¼ "	Very small.
Plentiful	" 12	10	¼ "	"

TABLE TURNIPS.

Sown May 22; pulled October 10.

Yellow Golden Ball, in use July 14; yield per acre, 1,365 bush. Good, solid.

White Milan, in use July 10; yield per acre, 1,148 bush. Some hollow.

Early White Flat American, in use July 14; yield per acre, 1,087 bush. Some hollow.

Early Stone, in use July 14; yield per acre, 863 bush. Many hollow.

All were bitter in flavour.

RHUBARB.

Old beds in use May 20.
Tobolsk, good quality
Herb, very poor,
Victoria, good quality and growth.

Prince Albert, poor.
Royal Albert, good.
Salt's Perfection, good.
Prince of Wales, very good.
Royal Linnæus, very good.
Magnum Bonum, very good.
Strawberry, very good, rather small stalks.
Early Crimson, very good.
Early Scarlet, very fair.

Seed of the following varieties was sown on May 6:—

Myatt's Linnæus.
Fottler's Improved.
Scarlet Nonpareil.
Prince Albert.
Victoria.
Royal Linnæus.
Strawberry.
Salt's Perfection.
Early Crimson.
Monarch.
Magnum Bonum.
Early Prince.
Brabant's Colossal.

THE FLOWER GARDEN.

The flower garden was again very good; most of the varieties grown flowered profusely, and proved a great attraction to visitors during the summer months.

ANNUALS.—Propagated in hot-house. Sown April 1 and 3.

Variety.	Set out.	Bloom.		Remarks.
		From	To	
Asters, 10 varieties	May 23	July 16	Sept. 30	Some very fine blooms.
Antirrhinum majus nanum	June 2	" 16	" 26	Fine.
Abronia umbellata	" 12	Aug. 24	" 26	Fair.
Ageratum, dwarf	" 12	July 24	" 26	Fine border.
Balsam, Camellia-flowered	" 1	" 18	" 14	Very good.
Brachycome iberidifolia	" 1	" 8	" 26	Attractive.
Bartonia aurea				Did not germinate.
Chrysanthemum coronarium	June 2	July 2	Oct. 10	Very fine.
Clarkia				Did not germinate.
Coreopsis, 3 varieties	May 26	July 9	Oct. 5	Quantity of bloom.
Dianthus, 4 varieties	" 25	" 9	" 10	Very fair show.
Gaillardia picta	June 2	" 12	" 5	Very good.
Godetia splendens				Did not germinate.
Helichrysum, double mixed	June 2	July 20	Sept. 26	Fair.
Iberis Gibraltarica				Did not germinate.
Lavatera rosea splendens	June 12	July 14	Oct. 5	Pink blooms, very pretty.
Lobelia, Crystal Palace				Did not germinate.
Marigold, Double Royal	June 2	July 20	Oct. 10	Bloomed very freely.
Mignonette	" 2	" 1	" 10	Very fine and sweet.
Nicotiana affinis	" 3	" 6	" 10	Very fine indeed.
Nasturtium	May 27	June 20	Sept. 1	Grand show.
Poppy, 6 varieties	" 27	" 21	" 1	Did splendidly, but sown rather too early in hot-house.
Portulaca	June 5	July 12	" 26	Very fine.
Phacelia				Did not germinate.
Phlox Drummondii, 4 varieties	May 26	June 21	Oct. 10	Very good.
Petunia, 3 varieties	" 26	July 1	" 10	Made a grand bed.
Pansies, many varieties	June 4	June 15	" 26	Very fine, some double.
Scabiosa, 2 varieties	" 2	July 20	" 12	Very good.
Sweet William	" 4	Biennial		Made good growth.
Salpiglossis	"			Did not germinate.
Stocks	May 23	June 22	Oct. 1	Some fine, but many single.
Tagetes, mixed	June 2	" 23	" 12	Bloomed well.
Zinnia elegans	" 2	July 8	" 5	"

ANNUALS—Sown in open, May 10.

Variety.	Bloom.		Remarks.
	From	To	
Antirrhinum	Aug. 4	Oct. 15	Fair.
Salpiglossis	" 8	" 10	Very handsome.
Gaillardia	" 8	" 10	Very good.
Nasturtium	July 20	Sept. 26	Did well.
Phacelia	" 20	" 26	Small blue flower.
Clarkia	" 26	" 26	Very fair.
Tagetes	" 18	Oct. 10	Very fine show.
Godetia	Aug. 8	Sept. 26	"
Poppy	July 27	Oct. 10	Good show.
Dianthus	Aug. 8	" 10	Did well.
Eschscholtzia	July 12	" 10	Bloomed very freely.
Bartonia aurea	" 16	Sept. 26	Did well.
Marigold	" 16	Oct. 1	"
Maize, Striped-leaved			Pretty leaf, 5 ft. high.
" Japonica gigantea			"
Scabiosa	Aug. 20	Oct. 12	Very fine.
Celosia	" 16	Sept. 14	Poor.
Nemophila	June 12	" 4	Bloomed freely.
Ageratum	July 26	" 26	Very pretty.

Sweet Pease.—32 varieties, sown April 22 and 27.

Earliest of All, in bloom July 4; fine blooms.
Earliest Sunbeams, in bloom, July 5; cream, very pretty.
McKenzie's Selection, in bloom, July 10, fair.
Laura Belle, in bloom, July 10; very good, mixed.
Eckford's Hybrid, in bloom, July 12; fair, mixed.
Tom Thumb, in bloom, July 18; fine for borders.
Blushing Beauty, in bloom, July 12: delicate pink; small, free bloomer.
New Bush, in bloom, July 15, 2½ feet high.
Double Flowering, in bloom, July 12; nice mixture.
Mrs. Walter Wright, in bloom, July 14; lavender, fine bloom.
King Edward VII., in bloom, July 14; scarlet, very fine.
Marchioness of Cholmondeley, in bloom, July 14; primrose, pink edge, good.
Mrs. Sydenham, in bloom, July 16; pink and flesh colour.
Orchid Flowering, in bloom, July 12; very fine, mixed.
Blanche Burpee, in bloom, July 12, pure white, rather small.
Navy Blue, in bloom, July 12, fine.
Burpee's Latest Special, in bloom, July 14, very fine indeed.
Hon. Mrs. Kenyon, in bloom, July 12; primrose, large free bloomer.
Dorothy Eckford, in bloom July 12; pure white, grand blooms.
Othello, in bloom, July 20; very dark, shy bloomer.
Sunproof, in bloom, July 14; scarlet, very fine.
Aurora, in bloom, July 12; striped pink and white.
Burpee's Dainty, in bloom, July 12, white, pink edge, very pretty.
Florence Spencer, in bloom, July 14; pink, large and half-double.
Scarlet Gem, in bloom, July 12; free bloomer, sunburns badly.
Jessie Cuthbertson, in bloom, July 14; good.
Lady Grisel Hamilton, in bloom, July 12; very handsome.
Agnes Johnston, in bloom, July 14; cream, pink and flesh colour.
Golden Rose, in bloom, July 12; cream.
Coccinea, in bloom, July 12; peculiar red.

Mrs. Dugdale, in bloom, July 14; shaded pink, very pretty.
Mrs. Wilmott, in bloom, July 14; large blooms.
The best of the blooms were over by September 10.

The following varieties of flowers were sown in the open on April 20 as borders to flower beds:—

Variety.	Bloom.		Remarks.
	From	To	
Mignonette	June 20	Oct. 13	Too large variety for border.
Whitlavia	" 30	Aug. 16	Poor.
Scabiosa	Aug. 6	Oct. 10	Fair, rather tall.
Phlox	July 20	" 10	Very good border.
Eschscholtzia	" 2	" 1	Good, but rather large.
Nemophila	June 10	Aug. 1	Good, but over too soon.
Candytuft	July 15	" 15	Very good border.

Sown in hot house April 1; set out June 2:—

Antirrhinum, Tom Thumb, in bloom from July 12, to September 26; very fine border.

Ageratum dwarf, in bloom from July 24, to September 26; fine border.

PERENNIALS.

All the old beds of perennial flowers made luxuriant growth the past season, and below are given some of the more noticeable ones, with time of flowering:—

Achillea, in bloom from July 1.
Clematis, in bloom from July 3, to August 10.
Centaurea macrophylla, in bloom from July 8.
Cactus, ground, in bloom from July 8, to August 4.
Columbine, in bloom from June 6 to August 1.
Campanula macrantha, in bloom from July 6 to September 1.
Delphinium, in bloom from July 15 to August 20.
Everlasting Pea, in bloom from July 8 to July 30.
Hollyhock, in bloom from August 7 to September 11.
Helianthus autumnalis, in bloom from July 24.
Irises, in bloom from May 20 to July 8.
Lupins, in bloom from June 30 to August 20.
Lilium elegans (orange), in bloom from July 5 to October 10.
" Tiger lily, in bloom from July 11 to July 30.
" white varieties, in bloom from July 23 to October 10.
Lychnis, in bloom from July 1 to August 30.
Mint, in bloom from July 15.
Paeonia tenuifolia, in bloom from May 23 to June 7.
Paeonies, other varieties, in bloom from June 25 to July 23.
Spiræa filipendula, in bloom from July 12.
" ulmaria, in bloom from July 8.
Sweet William, in bloom from July 4 to September 15.
Tulips, in bloom from May 10 to June 14.
Veronica salurgoides, in bloom from July 18 to September 1.

Special mention must be made of the Pæonies, which bore an abundance of magnificent blooms. Tulips, Irises, Cannas and Dahlias, were all extra fine. A large number of bulbs, roots, &c., of all the above species were sent up from the Central Experimental Farm, in the fall of 1904, or last spring. They nearly all did very well, and made a very fine show all the season.

A very fine collection of Lily bulbs sent also, including the following varieties:—*Lilium elegans, L. Krameri, L. concolor, L. speciosum rubrum, L. auratum, L. Brownii* and *L. elegans flore pleno, L. giganteum, L. longiflorum* and *L. multiflorum.* Nearly all these flowered profusely, and were greatly admired.

This fall another collection of bulbs of the following sorts has been sent up from the Central Farm, and set out in the gardens and grounds:—Tulips, single and double; Narcissus; Iris; Squills; Crocus; Snowdrops. There are several hundred bulbs in all, and it is hoped they will make a fine show next year.

TREES AND SHRUBS.

Trees and shrubs made a most vigorous growth during the past season, with the exception of the maples (native). These were attacked by aphis, and in some cases greatly injured.

Several long hedges of maple were dug up in the spring on account of doing injury to fruit and other bushes by shading them too much from the sunlight and air. Others will be removed next spring for the same cause.

Among the most attractive of the shrubs during the flowering period were a fine group of Lilacs, set out in 1901, which bloomed for the first time this year. The varieties named in the following list were covered with blossom:—

Syringa vulg. Maxime Cornu.
“ “ La Tour d'Auvergne.
“ “ de Marly.
“ “ Pres. Grevy.
“ “ Mathieu de Dombasle.
“ “ Lemoinii fl. pl., (White).
“ “ Mdme. Casimir Périer (White).
“ “ Chas. Joly.
“ “ Francisque Morel.
“ “ Virginité.
“ “ Madame Lemoine (White).
“ “ Rubella Plena.
“ “ Michael Buchner.
“ “ Condorcet.
“ “ Marie Legraye (White).

Several other varieties made good growth, but did not bloom.

Other conspicuous flowering trees and shrubs were—Prunus Maackii, Prunus Grayana maxima, Caragana, Tartarian Honeysuckle, Hawthorn and Siberian Crab.

A large bundle of tree and shrub seedlings was sent from the Experimental Farm Ottawa, last spring. Some of these were planted in the Arboretum, and the rest in a part of the grounds where it is proposed to establish a collection of some of the most attractive and best growing sorts. A list of the varieties is appended:—

Euonymus linearis,
Viburnum lentago,
Philadelphus nepaulensis,
“ grandiflorum,
Ceanothus americanus,
Cornus sibirica variegata,
Populus angustifolia,
Japan Tree Lilac,
Retinospora ericoides,
Thuya occid. globosa,
“ pyramidalis,
“ Wareana lutescens,
Picea Englemanni,
Pinus sylvestris globosa,
“ Beauvonensis,
Picea excelsa pygmaea,

Acer dasycarpum. Seed from Winnipeg.
Symphoricarpus (Gilbert Plains),
Syringa amurense,
Sea Buckthorn,
Pinus inops,
Juniperus Schottii,
Pinus cembra.
Golden Juniper,
Juniperus sabina variegata,
Abies excelsa procumbens,
" " pyramidalis.

THE ARBORETUM.

The trees and shrubs under observation in the Arboretum came through the winter very well, and made a good start in the spring, owing to the early season. Though the protection afforded by snow was comparatively light, through the light snowfall, yet, as the winter was on the whole mild, the trees did not kill back any more than usual. During the summer, the abundant rains caused an extra strong growth in all varieties.

The following additions were made to the Arboretum last spring, from the supply of trees, &c., sent up from the Central Farm:—

Syringa amurense,
Japan Tree Lilac,
Cornus sibirica variegata,
Symphoricarpus (Gilbert Plains),
Viburnum lentago,
Acer dasycarpum (Seed from Winnipeg),
Populus angustifolia,
Viburnum opulus (Riding Mountains),
Philadelphus nepaulensis,
Euonymus linearis,
Austrian Pine,
Red Pine,
Scotch Pine.

PLANTING TREE SEEDS.

Many inquiries are made during the year as to the best way to grow tree seeds in the Territories, where usually at the time they are sown, the soil is very dry. For several seasons, little or no trouble has been experienced from this cause on the Experimental Farm, while in some districts the weather has been very dry.

Maple seeds can be sown late in October, or early in May. It is not safe to sow all the supply of maple seed in the fall, as very often germination takes place too early in the spring, and frost kills the entire crop.

Ash seed should be sown in October. Elm seed should be sown as soon as gathered in June, though it sometimes succeeds if sown the following spring.

Elm seed requires a very light covering of fine, moist soil, not over ½-inch in thickness, while maple and ash should be covered 1 or 1½ inches.

Tree and shrub seeds should be sown in rows about 30 inches apart to permit horse cultivation when considerable quantities are grown. In all cases the land should be prepared the year preceding sowing, so as to have the soil as fine as possible. Breaking and backsetting new land, and summer-fallowing old, make the best and safest preparation.

Trees should be transplanted when seedlings are 2 years old. When left until 3 or 4 years old, the trouble and expense are greatly increased.

A large quantity of tree and shrub seedlings and seeds are available for next spring's distribution. A list of a few of the best is given, with the uses to which they are adapted.

Common Name.	*Botanical Name.*
For shelterbelts or windbreaks—	
Native Maple, or Box Elder.	Negundo aceroides.
Voronesh Willow.	Salix voronesh.
Sharp-leaved Willow.	Salix acutifolia.
Green Ash.	Fraxinus pennsylvanica.
For avenue or shade—	
American Cottonwood.	Populus deltoidea.
“ Elm.	Ulmus americana.
Russian Poplar.	(Several species).
Mountain Ash, American.	Pyrus americana.
For hedges—	
Siberian Pea Tree.	Caragana arborescens.
Common Cotoneaster.	Cotoneaster integerrima.
Common Lilac.	Syringa vulgaris.
Tartarian Honeysuckle.	Lonicera tatarica.
Native Hawthorn.	Crataegus crus galli.
Scarlet Haw.	Crataegus coccinea.
Breaking Buckthorn.	Rhamnus frangula.

For ornamental shrubbery those recommended for hedges are useful, and also the following:—

Dwarf Caragana.	Caragana pygmæa.
Sorbus-leaved Spiræa.	Spiræa sorbifolia.
Spiræa arguta.	Spiræa arguta.
Van Houtte's Spiræa.	Spiræa Van Houttei.
Japanese Spiræa.	Spiræa Japonica.

Climbers for porches, &c.:—Virginia Creeper, Clematis, Hops, Climbing Honeysuckle, and Wild Cucumber.

FRUIT TREES.

PLANTING.

Last spring several hundred cross-bred apples and seedlings were sent up from the Experimental Farm, Ottawa, and planted. A list of the varieties and numbers is given below.

Cross-bred Apple Trees.

5 Charles.
10 Columbia.
8 Bow.
5 Eve.
6 Tony.
2 Aurora.
6 Pioneer.
10 Alberta.
5 Dawn.
5 Manitou.
2 Ruby.
2 Carleton.
5 Prince.
2 Northern Queen.
3 Elsa.

Seedlings of Cross-bred Apples.

19	Seedlings of	Sparta.
2	"	Olive.
2	"	Susan.
4	"	Gordon.
7	"	Cluster.
3	"	Jane.
2	"	Bude.
11	"	Akers.
25	"	Sankey.
13	"	Aurora.
28	"	Manitou.
30	"	Tony.
38	"	Alberta.
7	"	Prince.
26	"	Garnet.
10	"	Pioneer.
1	"	Dean.
17	"	Columbia.
3	"	Sam.
11	"	Eaton.
2	"	Hudson.
17	"	Stork.
20	"	Northern Queen.
18	"	Mary.
9	"	Romney.

20	Seedlings of	Jewel.
26	"	Foster.
9	"	Robin.
7	"	Silvia.
8	"	Madge.
20	"	Golden.
8	"	Lizzie.
6	"	Raymond.
3	"	Pringle.
20	"	Carleton.
10	"	Stork.
13	"	No. 572.
12	"	Derby.
6	"	Dawn.
7	"	Edna.
19	"	Caleb.
9	"	No. 432.
2	"	Blushed Calville.
3	"	Small Red Apple.
2	"	Hare Pipka.
8	"	Elsa.
4	"	No. 768.
3	"	No. 218.
7	"	No. 570.

These were all set out in new plots of ground, being planted 15 feet apart each way, or else being used to fill vacancies in the older orchards. The balance were put in nursery rows till room can be found for them in a plot which is being prepared.

PLUMS.

Twelve seedlings of Carstesen plum and one of Aitkin plum were received, and planted in the plum orchard.

FRUIT CROP.

SIBERIAN CRAB (*Pyrus baccata*).

The Siberian Crab trees fruited well as usual, but the crop was hardly as heavy as in 1904.

CROSS-BRED APPLES.

A few of the Cross-bred apple trees fruited this year, namely, Cavan, No. 19, Aurora, No. 45. The fruit was considerably larger than the Pyrus baccata, but most of the large ones were stolen long before they were ripe.

Some seedling trees of cross-bred apples also fruited, but in most cases reverted more or less to the original type of Pyrus baccata, and consequently will be discarded, being of no greater value than the baccata.

PLUMS.

A remarkably heavy crop of fruit set, and for the most part, completely ripened, as this year there were no frosts sufficient to harm the fruit before October. A number of branches were broken down by the weight of plums.

Manitoba Native, Weaver and Aitkin Plums all produced abundantly.

SAND CHERRY.

Seedling of Wonder Sand Cherry, planted 1901. This fruited for the first time this year. The fruit was quite a good size and sweet.

SMALL FRUITS.

CURRANTS.

A very heavy crop of fruit set, but was attacked by the currant maggot (*Epochra canadensis*), and at the time of ripening it was found that more than half the crop was infested with the maggots, causing the fruit to be valueless, unless very carefully picked, which was a slow and tedious job.

RASPBERRIES.

The raspberry crop was good. The frequent rains during July and the early part of August when the fruit was filling, helped it considerably.

Marlborough, Caroline, Kenyon Seedling, Dr. Reider, Garfield, Mary, Turner and Miller raspberries, with Older and Hillborn black caps are the varieties being grown at present.

GOOSEBERRIES.

Gooseberries were practically a failure this year. Some of the bushes had a few berries on, but the majority were quite bare.

STRAWBERRIES.

The strawberry plants set out in 1904 came through the winter satisfactorily, but did not produce any fruit, except a few odd berries. They have been well covered up again this fall, and it is hoped they will fruit well next season.

CATTLE.

The herd of cattle at present consists of 19 pure bred Shorthorn females and 7 bulls, and 28 grade animals.

Last winter the entire herd was tested for tuberculosis, and not one reacted.

AUCTION SALE OF PURE BRED STOCK.

An auction sale of pure bred shorthorn cattle and of swine was held on May 11 last. On the two preceding days and nights rain and snow fell, making the roads almost impassable, causing a very small attendance.

Four head of cattle and two pigs were sold, and the others were withdrawn.

FEEDING TESTS.

On December 2, 4 three-year old steers were purchased, and on December 14, 4 two-year olds, with the object of ascertaining at which age the animals could be most economically fattened. They were tested with tuberculin and found to be healthy.

The test was for 16 weeks, commencing on December 16 and ending on April 7.

The steers were divided into two lots; Lot 1 comprising the 2 year-old animals, and Lot 2 the 3 year-olds, and were fed the following ration:—

Lot 1, per head, per day.—11 lbs. ensilage, 8 lbs. straw, 12 lbs. roots and ½ lb. ground linseed. In addition, meal was fed at the rate of 2 lbs. for each animal per day, and increased by 2 lbs. each month during the test.

Lot 2, per head, per day.—15 lbs. ensilage, 14 lbs, straw, 15 lbs. roots and ½ lb. ground linseed. Meal, 4 lbs. each per day for first month, increased 2 lbs. per day each month of test.

The straw was cut, and mixed with the ensilage before being fed.

The meal used consisted of two parts barley and one part small wheat.

Before the test started the animals were fed the same ration as during the first month of test, except that only ¼ lb. of ground linseed was fed, instead of ½ lb. After test was completed till the steers were sold on April 25, they were fed the same as during the last month of test.

Following will be found a statement of the total amount and estimated value of the feed consumed, the monthly and total weights and gains of each lot during the test, and a summary of the financial result of the transaction.

Total Weight and Estimated Value of Feed Consumed During the Whole Period from Date Bought till Sold.

Before Test Started (Lot 1, 2 Days, Lot 2, 14 Days).

Feed.	Value.	Lot 1.		Lot 2.	
		Lbs.	Cost.	Lbs.	Cost.
			$ cts.		$ cts.
Ensilage	$2 per ton	88	0 09	840	0 84
Straw	$1 ″	64	0 03	784	0 39
Roots	5c. per bush.	80	0 07	560	0 47
Meal	⅔c. per lb	16	0 10	224	1 49
Ground linseed	2c. ″	2	0 04	14	0 28
			0 33		3 47

During Test (112 Days).

Feed.	Value.	Lot 1. Lbs.	Lot 1. Cost.	Lot 2. Lbs.	Lot 2. Cost.
Ensilage	$2 per ton	4,928	4 92	6,720	6 72
Straw	$1 ″	3,584	1 79	6,272	3 13
Root	5c. per bush.	5,376	4 48	6,720	5 22
Meals	⅔c. per lb	2,240	14 93	3,136	20 90
Ground linseed	2c. ″	186	3 72	186	3 72
			29 84		39 69

Till Sold (18 Days).

Feed.	Value.	Lot 1. Lbs.	Lot 1. Cost.	Lot 2. Lbs.	Lot 2. Cost.
Ensilage	$2 per ton	792	0 79	1,080	1 08
Straw	$1 ″	576	0 29	1,008	0 50
Roots	5c. per bush.	864	0 72	1,080	0 90
Meal	⅔c. per lb	576	3 84	720	4 80
Ground linseed	2c. ″	36	0 72	36	0 72
			6 36		8 00

Summary Cost of Feeding.

——	Lot 1.	Lot 2.	Total.
	$ cts.	$ cts.	$ cts.
Before test	0 33	3 47	3 80
During test	29 84	39 69	69 53
Till sold	6 36	8 00	14 36
Total	36 53	51 16	87 69
Average per steer	9 13	12 79	

Monthly Weights and Gains During Test.

——	Lot 1.	Lot 3.
	Lbs.	Lbs.
Weight at start of test	2,880	4,900
End of 1st 4 weeks—Weight	2,980	5,100
" " " Gain	100	200
" 2nd " Weight	3,260	5,330
" " " Gain	280	230
" 3rd " Weight	3,490	5,570
" " " Gain	230	240
" 4th " Weight	3,740	5,880
" " " Gain	250	310
Total gain during test	860	980

Summary of Financial Result of the Transaction.

——	Lot 1.	Lot 2.
Weight bought	2,880 lbs.	5,125 lbs.
At	$ 20 00 per head.	3⅛ cents per lb.
Amount paid	80 00	$160 15
Cost of feed	36 53	51 16
Total cost	116 53	211 31
Weight when sold	3,840 lbs.	6,000 lbs.
Less 5 per cent shrinkage	192	300
Net weight sold	3,648	5,700
At	3¾ cents.	4 cents.
Amount received	$136 80	$228 00
Total gain in weight	960 lbs.	875 lbs.
Average gain per steer	240 "	219 "
Net profit	$ 20 27	$ 16 69
Profit per steer	5 07	4 17

HORSES.

There are 13 horses now on the farm. Since sending in my last report, the following changes have taken place: One horse died, two old mares were shot on account of extreme age, and a herd pony was exchanged. A span of driving horses and one work horse have been bought, and last spring a colt was born.

SWINE.

Last spring a Yorkshire white boar and sow were sent to the farm from the Central Farm at Ottawa, and have done well since their arrival. During the past twelve months 2 Berkshire boars and 7 sows, and 2 Tamworth boars and 1 sow have been sold to farmers for breeding purposes.

There are at present on the farm 11 Yorkshire White, 23 Berkshire and 9 Tamworth pigs.

POULTRY.

Barred Plymouth Rock, Black Minorca and Light Brahma fowls are kept. Settings of eggs and young fowls are sold to applicants so far as the supply permits.

Record was kept of the number of eggs laid by each breed for 7 months, April to October inclusive, and the results are given below:—

—	PLYMOUTH ROCKS.			BLACK MINORCAS.			LIGHT BRAHMAS.		
	Hens.	Eggs.	Eggs per hen.	Hens.	Eggs.	Eggs per hen.	Hens.	Eggs.	Eggs per hen.
April	10	171	17·1	13	183	14·1	8	93	11·6
May	10	128	12·8	13	199	15·3	8	87	10·9
June	11	137	12·5	14	102	7·3	7	61	8·7
July	12	138	11·5	14	86	6·1	6	32	5·3
August	12	142	11·8	14	120	8·6	6	20	3·3
September	12	100	8·3	14	57	4·1	5	10	2·
October	12	65	5·4	14	19	1·4	5	0	0·
Total		881			766			303	
Average No. hens	11·3			13·7			6·4		
" " eggs per hen		78			56			47	

INSTITUTE MEETINGS.

I had the pleasure of attending institute meetings in the month of June, in company with Mr. George Harcourt (then superintendent of institute work for the Territories), at Kyle, Shanon, Kinistino, Melfort, Birch Hills and Red Deer Hill, all south or southeast of Prince Albert in Saskatchewan. These meetings were arranged by the Department of Agriculture at Regina, and all, with one exception, when heavy rain interfered, were very well attended.

These meetings gave me an opportunity of seeing the growing crops throughout a large section of the country, as well as of seeing the general conditions of farming carried on in the northern settled part of Saskatchewan. For some weeks prior to my visit, the weather in the north had been very dry, and grain as a rule was further advanced than in the southern districts, but was not so heavy, and weeds were more noticeable. The crops however on the whole looked very well, with many very fine fields of wheat and oats.

Having visited this section of country several years ago, when there was no railroad, or way of disposing of the products grown, except teaming very long distances to market, it gave me great pleasure to visit field after field of grain, and to see alongside cars ready to take it to the consumer. Then, Melfort and Kinistino consisted of a post office and a school. Now, both are large and ambitious towns, giving good evidence of what two magnificent districts can do, when facilities are provided for taking out of the country its products.

GRAIN DEALERS' TRIP.

Through the kindness of the grain dealers of Winnipeg, I enjoyed a trip of three days' duration before harvest time through the wheat fields of part of Assiniboia and Manitoba. The crops along the new railway lines from Regina, by way of Arcola to Brandon, and from Kirkella to Lipton, were especially interesting to me, as it was my first visit through these new and fast-growing settlements.

Needless to say, grain looked fine everywhere, and in some districts, harvesting was under way.

TRIP THROUGH ALBERTA DURING HARVEST TIME.

It was my great privilege during the latter part of August, and early in September, to take an extended trip through the newly formed province of Alberta, with yourself, and to see with much pleasure the large crops of grain being harvested, and in some cases threshed.

At High River and Claresholm (on the Canadian Pacific Railway from Calgary to Macleod) extended trips were made through the districts, and on all sides fall wheat was either in stook or being threshed. Spring wheat and oats were being cut, and everywhere the grain was very fine indeed. At Leavings and Macleod the crops were also very fine.

On reaching Lethbridge, a special train was placed at our disposal to see the grain fields as far as Cardston, through the kindness of Mr. A. T. Galt, president of the Galt Coal Mines, and of Mr. Magrath, the latter accompanying us over the line. On account of dry weather the crops did not appear so heavy south of Lethbridge as further north, but everywhere evidence was seen of large fields being sown with winter wheat; one field alone contained 2,000 acres.

At Raymond, the large sugar factory was being put in order for its harvest. On all sides sugar beets were observed, and those fields examined were certainly extra good.

As soon as possible after the new province was born, Edmonton was reached, and a few days spent among the grain fields surrounding the future capital. Everywhere the crops were fine, very many were in stook. Winter wheat was not grown so extensively in the north as in the south the past season, but considerable had been sown in all the districts visited.

The districts of Lacombe, Red Deer and Innisfail were in turn visited, and as in all others the grain was partially in stook, threshed and standing, but everywhere it was good, with a few exceptions where hail had unfortunately some time before visited strips of the country we passed through.

An afternoon was spent visiting the Canadian Pacific Railway irrigation canal at Calgary, where most extensive work was being carried on, and which will in future prove of vast benefit to a very large section of country.

After returning home, and spending two days, a start was made for Battleford. It gave me great pleasure to visit for the first time the ancient capital of the Territories.

North Battleford, which came into existence three months before, was all bustle, from the many land seekers making it their headquarters while looking up homesteads, and from the erection of the many new buildings.

The crops from Regina north to and about Saskatoon were very fine, nearly all were in stook, with considerable threshing done at several of the stations, especially about Dundurn and Saskatoon. Along the Canadian Northern Railway from the Junction to Battleford, the country is being newly settled, but many towns have sprung up along the line, and in a year or two the whole country will no doubt be fully settled.

EXCURSION TO THE EXPERIMENTAL FARM.

The Department of Agriculture at Regina ran excursion trains from Fleming on the east and Caron on the west, and from Prince Albert in the north, a distance of over 400 miles, on July 19, when over 3,000 people visited the Indian Head Farm. Classes in stock-judging, butter-making and domestic cooking were carried on during the day in large tents specially provided.

In addition to the farm's staff of men and horses employed in conveying the large crowd over the farm, many of the town and country people also kindly gave their assistance, and during the time between the arrival and departure of the trains, the farm presented a very lively appearance. Every field and plot was visited by the largest and most agreeable company that has ever taken possession of the farm.

On July 4 large numbers attending the Indian Head sports visited the farm; and on August 8 and 9, during the Central Assiniboia Exhibition held at Indian Head, great numbers drove and walked through the grounds.

DISTRIBUTION OF SAMPLES.

During the months of March, April and May, the usual distribution of samples of the products of the Farm was made to residents in Assiniboia, Alberta and Saskatchewan.

As there was an increase in the number of applications of over 30 per cent compared with those received in the winter of 1903-4, and the supply of samples was no greater than usual, a very large number were disappointed.

The samples distributed were as follows:—

Wheat	546	bags of 3 lbs. each.
Oats	406	“ 3 “
Barley	197	“ 3 “
Pease	87	“ 3 “
Sundries (flax, rye, spelt)	25	“ 3 “
Potatoes	618	“ 3 “
Tree seeds (maple and ash)	759	“ ½ lb. each.
Shrub seeds (Caragana)	810	packets.
Grass seed, Brome	10	bags of 1 lb. each.
Grass seed, Western Rye	60	“ 1 “
Small seeds, 545 bags containing 8,175 packages of shrub, flower, root and garden seeds and corn.		
Rhubarb roots	88	packages.
Fruit bushes	241	“
Tree and shrub seedlings	668	“
Express parcels, containing tree and shrub seedlings	130	parcels.

CORRESPONDENCE.

During the 12 months ending October 31, 1905, 7,820 letters, irrespective of reports on grain and other samples, were received, and 7,874 letters, not counting circulars of instruction sent with samples, were mailed from this office.

METEOROLOGICAL.

Month.	Temperature, Maximum.		Temperature, Minimum.		Rainfall.		Snow-fall.	Hours of Bright Sunshine.
1904.	Date.	Degrees	Date.	Degrees	Days.	Inches.	Inches.	
November	2	66	30	—13	....	....	3·75	114·4
December	30	39	26	—38	....	....	10·	66·8
1905.								
January	4	30	9 & 24	—34	....	......	2·5	97·9
February	27	51	4	—43	....	....	4·5	139·2
March	21	63	12	—10	2	·26	6·5	153·6
April	26	79	10 & 17	10	2	·32	2·5	245·
May	31	78	4	16	10	3·34	2·	199·8
June	2 & 3	85	9 & 23	35	17	5·16	....	169·1
July	13, 19, 20	80	22 & 24	42	15	2·47	....	265·4
August	25	88	29	39	7	2·28	....	264·
September	28	81	11 & 23	31	8	5·00	....	179·2
October	3 & 5	73	19 & 27	9	3	·34	2·	90·9
					64	19·17	33·75	1,985·3

I have the honour to be, sir,
Your obedient servant,

ANGUS MACKAY,
Superintendent.

APPENDIX TO THE REPORT OF THE MINISTER OF AGRICULTURE

EXPERIMENTAL FARMS

REPORTS

OF THE

DIRECTOR		Wm. SAUNDERS, C.M.G., LL.D.
AGRICULTURIST		J. H. GRISDALE, B. Agr.
HORTICULTURIST		W. T. MACOUN
CHEMIST		F. T. SHUTT, M.A.
ENTOMOLOGIST and BOTANIST		JAS. FLETCHER, LL.D.
CEREALIST		C. E. SAUNDERS, Ph.D.
POULTRY MANAGER		A. G. GILBERT
SUPT. EXPERIMENTAL FARM,	Nappan, N.S.	R. ROBERTSON
" " "	Brandon, Man.	N. WOLVERTON, B.A.
" " "	Indian Head, Sask.	ANGUS MACKAY
" " "	Agassiz, B.C.	THOS. A. SHARPE

FOR

1906

PRINTED BY ORDER OF PARLIAMENT

OTTAWA
PRINTED BY S. E. DAWSON, PRINTER TO THE KING'S MOST
EXCELLENT MAJESTY
1907

APPENDIX

TO THE

REPORT OF THE MINISTER OF AGRICULTURE

ON

EXPERIMENTAL FARMS

OTTAWA, March 30, 1907.

SIR,—I beg to submit for your approval the twentieth annual report of the work done, and in progress, at the several experimental farms.

In addition to my report, you will find appended reports from the following officers of the Central Experimental Farm:—From the Agriculturist, Mr. J. H. Grisdale; from the Horticulturist, Mr. W. T. Macoun; from the Chemist, Mr. Frank T. Shutt; from the Entomologist and Botanist, Dr. James Fletcher; from the Cerealist, Dr. C. E. Saunders, and from the Poultry Manager, Mr. A. G. Gilbert.

From the branch experimental farms there are reports from Mr. R. Robertson, Superintendent of the Experimental Farm for the Maritime Provinces, at Nappan, Nova Scotia; from Mr. N. Wolverton, B.A., Superintendent of the Experimental Farm for Manitoba, at Brandon; from Mr. Angus Mackay, Superintendent of the Experimental Farm for Saskatchewan, at Indian Head, and from Mr. Thomas A. Sharpe, Superintendent of the Experimental Farm for British Columbia, at Agassiz.

In these reports there will be found the results of many important and carefully conducted experiments in agriculture, horticulture and arboriculture, the outcome of practical and scientific work in the fields, barns, dairy and poultry buildings, orchards and plantations at the several experimental farms; also of scientific research in connection with the breeding of cereals and in determining their relative value; also of research work in the chemical laboratories bearing on many branches of agricultural and horticultural employment; and of information gained from the careful study of the life histories and habits of injurious insects and the methods by which noxious weeds are propagated and spread, together with the most practical and economical measures for their destruction. In the report of the Entomologist and Botanist will also be found particulars of the experiments and observations which have been made during the past year in connection with the apiary.

The large and constantly increasing demand by the farmers of the Dominion for the publications issued from the experimental farms, the rapidly extending correspondence, and the readiness shown by farmers everywhere to co-operate with the work of the farms in the testing of new and promising varieties of cereals, furnish gratifying evidence of the desire for information among this class of the community also of the high esteem in which the work of the farms is held. It is hoped that the facts brought together in the present issue will be found of much practical value to the Canadian farmer and fruit-grower, and that they may assist in advancing agriculture and horticulture in this country.

I have the honour to be, sir,
Your obedient servant,

WM. SAUNDERS,
Director of Experimental Farms.

To the Honourable
The Minister of Agriculture,
Ottawa.

ANNUAL REPORT OF THE EXPERIMENTAL FARMS

1906

REPORT OF THE DIRECTOR

WM. SAUNDERS, C.M.G., LL.D., F.R.S.C., F.L.S.

Another satisfactory harvest has been reaped and farming in Canada is in the ascendant. Many thousands of immigrants are flocking to our shores and millions of acres of virgin lands are being brought under crop. The mass of surplus food products available for export shows every year a marked increase while as yet the area of land under cultivation is relatively small. What these exports will amount to in the near future when the country becomes well settled and the acreage of crop much larger no one can foretell. This is a country of vast agricultural resources.

In the maritime provinces the hay crop has been in most districts above the average; wheat and oats have given a fair return but in some sections have been somewhat below the average; barley has given good returns. Indian corn has given excellent crops cut green for fodder; field roots have done fairly well, mangels being about an average crop and turnips below the average. Potatoes have done well.

In Quebec the hay crop has been less than an average and most grain crops have fallen a little short although the quality has been good. The output of dairy products has been large and the prices highly satisfactory.

In Ontario the wheat, both fall and spring, gave excellent crops, oats also and barley were the best crops had for many years, while field roots and Indian corn gave about an average return. The hay crop was a little below the average.

The pastures were rather short in midsummer, but they improved later on. The year on the whole has been a successful one with dairy farmers and cheese and butter have brought excellent prices.

In fruits, fall apples were abundant, but the crop of the winter sorts was less than an average one. Plums gave a light crop, but most other fruits an average return.

In the Northwest provinces the crops have averaged remarkably well. The weather was favourable at seeding and at harvest time and the grain was saved in good condition. The total crop areas and yields of 1906 in the three provinces, Manitoba, Saskatchewan and Alberta according to official returns were as follows:

	Bushels.	Acres.	Average yield per acre. Bushels.
Wheat	94,110,626	4,614,827	20·39
Oats	86,216,627	2,024,127	42·59
Barley	20,779,734	591,393	35·13

This is an excellent showing.

CO-OPERATIVE EXPERIMENTS BY FARMERS THROUGHOUT CANADA.

Another distribution has been made from the experimental farms to Canadian farmers of samples of seed of high quality for the improvement of crops. In the endeavour to ascertain the relative merits of these different sorts as to their quality, productiveness and earliness in ripening, farmers everywhere have readily undertaken to co-operate with the experimental farms and to report the results at the close of the season. These joint efforts have been productive of much good and much information has thus been gathered in reference to the suitability of these different varieties to the climatic conditions prevailing in different parts of Canada.

During the past year nearly 48,000 farmers have joined in these co-operative tests. Many reports have been received expressing appreciation of the great value of this work.

The samples from the Central Experimental Farm during the distribution period have been sent out as follows: The samples of wheat and barley have weighed five pounds each, oats four pounds, sufficient of each of these cereals to sow one-twentieth of an acre. The samples of Indian corn, peas and potatoes have weighed three pounds each.

DISTRIBUTION BY PROVINCES.

Name of Grain.	Prince Edward Island.	Nova Scotia.	New Brunswick.	Quebec.	Ontario.	Manitoba.	Saskatchewan.	Alberta.	British Columbia.
Oats	630	1,196	1,820	5,842	2,314	580	817	557	132
Barley	99	408	293	1,947	718	241	300	177	46
Wheat	371	639	1,016	3,394	713	1,173	1,905	670	78
Peas	22	131	121	449	88	46	47	41	12
Indian corn	17	119	99	421	298	51	50	25	36
Potatoes	162	978	1,287	3,865	3,138	1,068	1,502	1,072	664
Total	1,301	3,471	4,636	15,918	7,269	3,159	4,621	2,542	968

Total number of samples distributed, 43,885.
Number of applicants supplied, 43,792.

Total number of packages of each sort distributed :—

Oats	13,888
Barley	4,229
Wheat	9,959
Peas	957
Indian corn	1,116
Potatoes	13,736
Total	43,885

The following list shows the number of packages which have been sent of the different varieties:—

Name of Variety.	Number of Packages.
OATS.	
Banner	3,922
Wide Awake	2,695
Improved Ligowo	2,290
White Giant	1,087
Thousand Dollar	1,007
Waverley	782
Danish Island	709
Tartar King	594
Abundance	406
Black Beauty	262
Goldfinder	92
Welcome	42
Total	13,888
BARLEY (Six-rowed).	
Mensury	1,455
Mansfield	634
Odessa	616
Claude	267
(Two-rowed.)	
Standwell	722
Invincible	535
Total	4,229
SPRING WHEAT.	
Preston	2,707
Red Fife	2,134
White Fife	1,255
Pringle's Champlain	953
Huron	916
Percy	792
Laurel	599
Stanley	561
Early Riga	42
Total	9,959

Name of Variety.	Number of Packages.
PEAS.	
Arthur	755
White Wonder	112
Daniel O'Rourke	38
Golden Vine	27
Prussian Blue	25
Total	957
INDIAN CORN.	
Early Leaming	240
Compton's Early	224
Longfellow	220
Selected Leaming	168
North Dakota White	148
White Cap Yellow Dent	59
Early Longfellow	57
Total	1,116
POTATOES.	
Maggie Murphy	1,981
Carman No. 1	1,784
Reeve's Rose	1,623
Everett	1,196
Rochester Rose	978
Early White Prize	793
Late Puritan	711
Uncle Sam	694
Burnaby Mammoth	682
Money Maker	651
Canadian Beauty	640
American Wonder	632
Swiss Snow Flake	404
Dr. Maerker	278
Clay Rose	248
Bovee	185
State of Maine	161
Gold Coin	77
Burpee's Extra Early	18
Total	13,736

DISTRIBUTION OF SAMPLES FROM THE BRANCH EXPERIMENTAL FARMS.

Samples were also distributed from the Branch Experimental Farms, as follows:—

Experimental Farm, Nappan, N.S.	
Spring wheat	100
Oats	212
Barley	43
Peas	40
Potatoes	263
Buckwheat	17
Total	675

Experimental Farm, Brandon, Man.	
Spring wheat	162
Oats	80
Barley	50
Peas	18
Potatoes	180
Total	490

Experimental Farm, Indian Head, Sask.	
Spring wheat	520
Oats	420
Barley	116
Peas	96
Flax, Rye and Spelt	53
Potatoes	753
Total	1,958

Experimental Farm, Agassiz, B.C.	
Oats	197
Barley	98
Peas	203
Potatoes	217
Total	715

By adding the number of farmers supplied by the branch farms to those supplied by the Central Farm we have a total of 47,723. The average number of samples sent out each year for the past ten years has been over 38,000.

It is remarkable how rapidly a supply of grain may be built up from a single four or five-pound sample. Take for instance, a sample of oats. The four pounds received will, if well cared for, usually produce from three to four bushels. This sown on two acres of land will at a very moderate estimate give one hundred bushels, and sometimes much more, but taking the lower figure as the basis for this calculation, the crop at the end of the second year would be sufficient to sow fifty acres, which at the same moderate computation would furnish 2,500 bushels, available for seed or sale at the end of the third year.

The critical point in these tests is the threshing of the grain at the end of the first season, and it is here that some farmers fail to get the full advantage of the experiment. The product of the one-twentieth acre plot is sometimes threshed in a large machine, which it is difficult to thoroughly clean, and in this way the grain becomes mixed with other varieties and practically ruined. At the Central Experimental Farm we thresh the produce of many of the small plots of grain by cutting off the heads, placing them in sacks and beating them with a stick, and winnowing until most of the chaff is got rid of, and the grain made clean enough for sowing.

Where the farmer is to use this seed for his own sowing it is not necessary that the sample be entirely free from chaff. It is, however, most essential if he is to get the full benefit of his experiment, that the grain be quite free from all admixture with other sorts. Farmers are expected to harvest the product of their experimental plot separately, and store it away carefully, threshing it by hand either with a flail or in such other manner as they may prefer. The results to be gained will abundantly repay the careful handling of the grain in this way.

Every season after the regular free distribution of the samples has been provided for the surplus grain grown on the experimental farms not required for sowing is sold to farmers in quantities of from 2 to 6 bushels or more each. In this way a considerable number of farmers are supplied every year with seed grain in these larger quantities, especially from the branch farms at Brandon and Indian Head.

SPECIAL EXPERIMENTS WITH FERTILIZERS.

In the Annual Report of the Experimental Farms for 1893, details were given on pages 8 to 24 of the results of a series of tests which had then been carried on for some years with the object of gaining information regarding the effects which follow the application of certain fertilizers and combinations of fertilizers on the more important farm crops.

These experiments have been continued, and a summary of the results obtained has been given each year, taking the average yield of crops from the beginning, adding the results for the current year, and then giving the average yield for the full time. These tests were undertaken on virgin soil, on a piece of land which was cleared for the purpose. For particulars regarding the clearing and preparing of the land for crop in 1887-88 and its subsequent treatment, the reader is referred to the earlier issues of this report.

VALUABLE INFORMATION GAINED.

From this long conducted series of tests some useful information has been gained.

These trials have shown that barn-yard manure can be most economically used in the fresh or unrotted condition; that fresh manure is equal, ton for ton, in crop-producing power to rotted manure, which, other experiments have shown, loses during the process of rotting about 60 per cent of its weight. In view of the vast importance of

Seedling Daisies, in perennial flower beds, Central Experimental Farm, Ottawa. (Photo F. T. Shutt.)

making the best possible use of barn-yard manure, it is difficult to estimate the value of this one item of information.

When these experiments were planned, the opinion was very generally held that untreated mineral phosphate, if very finely ground, was a valuable fertilizer, which gradually gave up its phosphoric acid for the promotion of plant growth. Ten years' experience has shown that mineral phosphate, untreated, is of no value as a fertilizer.

Sulphate of iron, which at the time these tests were begun, was highly recommended, as a means of producing increased crops, has also been proven to be of very little value for this purpose.

Common salt, which has long had a reputation with many farmers for its value as a fertilizer for barley, while others disbelieved in its efficacy, has been shown to be a valuable agent for producing an increased crop of that grain, while it is of much less use when applied to crops of spring wheat or oats. Land plaster or gypsum has also proven to be of some value as a fertilizer for barley, while of very little service for wheat or oats. Some light has also been thrown on the relative usefulness of single and combined fertilizers.

CHANGES MADE IN THE EXPERIMENTS.

After ten years' experience had demonstrated that finely-ground, untreated mineral phosphate was of no value as a fertilizer, its use was discontinued in 1898. Prior to this it had been used in each set of plots in Nos. 4, 5, 6, 7 and 8, in all the different series of plots, excepting roots. In 1898 and 1899, similar weights of the Thomas' phosphate were used in place of the mineral phosphate, excepting in plot 6 in each series. In this plot the Thomas' phosphate was used in 1898 only.

After constant cropping for ten or eleven years, it was found that the soil on these plots to which no barn-yard manure had been applied was much depleted of humus, and hence its power of holding moisture had been lessened, and the conditions for plant growth, apart from the question of plant food, had on this account become less favourable. In 1899 the experiments were modified and an effort made to restore some proportion of the humus and at the same time gain further information as to the value of clover as a collector of plant food. In the spring of that year ten pounds of red clover seed per acre was sown with the grain on all the plots of wheat, barley and oats. The young clover plants made rapid growth, and by the middle of October there was a thick mat of foliage varying in height and density on the different plots, which was ploughed under. No barn-yard manure was applied on plots 1 and 2 in each series from 1898 to 1905.

In 1900 all the fertilizers on all the plots were discontinued, and from then to 1905 the same crops were grown on all these plots from year to year without fertilizers, sowing clover with the grain each season. In this way some information has been gained as to the value of clover as a collector of plant food, and also as to the unexhausted values of the different fertilizers which had been used on these plots since the experiments commenced. In 1905 and 1906 all the fertilizers were again used as in 1898.

SPECIAL TREATMENT OF PLOTS OF INDIAN CORN AND ROOTS.

As it was not practicable to sow clover with the Indian corn and root crops, the sowing of these latter crops was discontinued in the spring of 1900 and clover sown in their place in the proportion of 12 pounds per acre. The clover on these plots made strong growth, so strong as to necessitate twice cutting during the season, the cut clover being left on the ground in each case to decay and add to the fertility of the soil. The clover was left over for further growth in the spring of 1901, and ploughed under for the roots about May 10, and for corn about the middle of that month. Then roots and Indian corn were again sown. In 1902 crops of Indian corn and roots were grown on these plots. In 1903 the land was again devoted to clover and was in Indian corn and roots again in 1904 and each year since.

WHEAT PLOTS.

The seed sown on each of these plots from the beginning has been in the proportion of about 1½ bushels per acre, excepting in 1894; and the varieties used were as follows:— In 1888 to 1891, White Russian, and in 1892-3, Campbell's White Chaff. In 1894, Rio Grande was used, and from 1895 to 1906, inclusive, Red Fife. In 1906 the Red Fife was sown May 3, and was ripe August 17.

TABLE I.
EXPERIMENTS WITH FERTILIZERS ON PLOTS OF WHEAT.

Number of Plot.	Fertilizers applied each year from 1888 to 1898 or 1899. No fertilizers used from that time to 1905. Clover sown in 1899 and each year after to 1905 with the grain and ploughed under in the autumn. In 1905-6 fertilizers again applied as in 1898. Clover discontinued.	Average Yield for Eighteen Years. Yield of Grain. Per acre.		Average Yield for Eighteen Years. Yield of Straw. Per acre	19th Season, 1906. Variety, Red Fife. Yield of Grain. Per acre.		19th Season, 1906. Variety, Red Fife. Yield of Straw. Per acre	Average Yield for Nineteen Years. Yield of Grain. Per acre.		Average Yield for Nineteen Years. Yield of Straw. Per acre
		Bush.	lbs	Lbs.	Bush.	lbs.	Lbs.	Bush.	lbs.	Lbs.
1	Barn-yard manure (mixed horse and cow manure), well rotted, 12 tons per acre in 1888; 15 tons per acre each year after to 1898 inclusive. No manure used from 1899 to 1905. In 1905-6 15 tons per acre again used.	22	$31\frac{17}{18}$	3928	23	50	3180	22	36	3888
2	Barn-yard manure (mixed horse and cow manure) fresh, 12 tons per acre in 1888; 15 tons per acre each year after to 1898 inclusive. No manure used from 1899 to 1905. In 1905-6 15 tons per acre again used.	22	46	3969	22	50	3200	22	$46\frac{4}{19}$	3928
3	Unmanured from the beginning.	11	$47\frac{14}{18}$	1910	13	20	2100	11	$58\frac{8}{19}$	1920
4	Mineral phosphate, untreated, finely ground, 500 lbs. per acre, used each year from 1888 to 1897 inclusive. In 1898 and 1899 a similar weight of the Thomas phosphate was used. No fertilizer used from 1900 to 1905. In 1905-6 Thomas phosphate again used as in 1899.	12	$38\frac{1}{18}$	2035	15	10	2200	12	$46\frac{1}{19}$	2044
5	Mineral phosphate, untreated, finely ground, 500 lbs., nitrate of soda, 200 lbs. per acre used each year from 1888 to 1897 inclusive. In 1898 and 1899, 500 lbs. of the Thomas phosphate were used in place of the mineral phosphate. No fertilizers used from 1900 to 1905. In 1905-6 fertilizers again used as in 1899.	13	$29\frac{8}{18}$	2653	18	10	2710	13	$43\frac{18}{19}$	2656
6	Barn-yard manure, partly rotted and actively fermenting, six tons per acre; mineral phosphate, untreated, finely ground, 500 lbs. per acre, composted together, intimately mixed and allowed to heat for several days before using, applied each year from 1888 to 1897 inclusive. In 1898, 500 lbs. of Thomas phosphate were used in place of the mineral phosphate. No fertilizers used from 1899 to 1905. In 1905-6 fertilizers again used as in 1898.	19	$20\frac{8}{18}$	3280	28	20	3420	19	$48\frac{16}{19}$	3287
7	Mineral phosphate, untreated, finely ground, 500 lbs.; nitrate of soda, 200 lbs.; wood ashes, unleached, 1,000 lbs. per acre, used each year from 1888 to 1897 inclusive. In 1898 and 1899, 500 lbs. of the Thomas phosphate were used in place of the mineral phosphate. No fertilizers used from 1900 to 1905. In 1905-6 fertilizers again used as in 1899	13	$58\frac{17}{18}$	2622	21	00	3040	14	$21\frac{2}{19}$	2644

TABLE I.—EXPERIMENTS WITH FERTILIZERS ON PLOTS OF WHEAT—*Concluded.*

No. of Plot.	Fertilizers applied each year from 1888 to 1898 or 1899. No fertilizers used from that time to 1905. Clover sown in 1899 and each year after to 1905 with the grain and ploughed under in the autumn. In 1905-6 fertilizers again applied as in 1898. Clover discontinued.	Average Yield for Eighteen Years.			19th Season, 1906. Variety, Red Fife.			Average Yield for Nineteen Years.		
		Yield of Grain. Per acre.		Yield of Straw. Per acre	Yield of Grain. Per acre.		Yield of Straw. Per acre	Yield of Grain. Per acre.		Yield. of Straw. Per acre
		Bush.	lbs.	Lbs.	Bush.	lbs.	Lbs.	Bush.	lbs.	Lbs.
8	Mineral phosphate, untreated, finely ground, 500 lbs.; wood ashes, unleached, 1,500 lbs. per acre, used each year from 1888 to 1897 inclusive. In 1898 and 1899, 500 lbs. of the Thomas phosphate were used in place of the mineral phosphate. No fertilizers used from 1900 to 1905. In 1905-6 fertilizers again used as in 1899...	12	$2\frac{4}{18}$	2232	16	20	2320	12	$15\frac{15}{19}$	2237
9	Mineral superphosphate, No. 1, 500 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizer used from 1900 to 1905. In 1905-6 fertilizer again used as in 1899................	12	$40\frac{3}{18}$	2008	13	20	2130	12	$42\frac{5}{19}$	2014
10	Mineral superphosphate, No. 1, 350 lbs.; nitrate of soda, 200 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizers used from 1900 to 1905. In 1905-6 fertilizers again used as in 1899...	13	$33\frac{12}{18}$	2930	16	30	1960	13	$42\frac{18}{19}$	2879
11	Mineral superphosphate, No. 1, 350 lbs., nitrate of soda, 200 lbs., wood ashes, unleached, 1,500 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizers used from 1900 to 1905. In 1905-6 fertilizers again used as in 1899........	14	$21\frac{7}{18}$	2858	19	41	3201	14	$38\frac{4}{19}$	2876
12	Unmanured from the beginning...........	10	$41\frac{2}{18}$	1874	13	40	1980	10	$50\frac{10}{19}$	1880
13	Bone, finely ground, 500 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizer used from 1900 to 1905. In 1905-6, bone again used as at first..	12	$52\frac{7}{18}$	2106	15	00	2200	12	57	2111
14	Bone, finely ground, 500 lbs., wood ashes unleached, 1,500 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizers used from 1900 to 1905. In 1905-6 fertilizers again used as at first....	15	$32\frac{14}{18}$	2658	19	00	2560	15	$43\frac{13}{19}$	2653
15	Nitrate of soda, 200 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizers used from 1900 to 1905. In 1905-6 fertilizer again used as at first....	14	$23\frac{16}{18}$	2477	14	10	2360	14	$23\frac{5}{19}$	2471
16	Muriate of potash, 150 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizer used from 1900 to 1905. In 1905-6 fertilizer again used as at first	15	$32\frac{17}{18}$	2312	17	30	2190	15	$39\frac{2}{19}$	2306
17	Sulphate of ammonia, 300 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizer used from 1900 to 1905. In 1905-6 fertilizer again used as at first.........	13	$4\frac{5}{18}$	2474	16	20	2160	13	$14\frac{1}{19}$	2457
18	Sulphate of iron, 60 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizer used from 1900 to 1905. In 1905-6 fertilizer again used as at first........	12	$53\frac{11}{18}$	2024	14	4	2460	12	$57\frac{6}{19}$	2042
19	Common salt (Sodium chloride), 300 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizer used from 1900 to 1905. In 1905-6 fertilizer again used as at first	13	$52\frac{13}{18}$	1676	16	00	2210	13	$59\frac{8}{19}$	1704
20	Land plaster or gypsum (Calcium sulphate), 300 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizer used from 1900 to 1905. In 1905-6 fertilizer again used as at first..........	12	$56\frac{15}{18}$	1958	15	30	2320	13	$4\frac{17}{19}$	1977
21	Mineral superphosphate, 500 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizer used from 1900 to 1905. In 1905-6 fertilizer again used as at first......	13	$16\frac{16}{18}$	1954	16	10	1980	13	$25\frac{18}{19}$	1955

BARLEY PLOTS.

The quantity of seed sown per acre on the barley plots was about 2 bushels in 1889 to 1891, $1\frac{1}{2}$ bushels in 1892 and 1893, and 2 bushels from 1894 to 1906 inclusive. Two-rowed barley was used for seed throughout until 1902, when Mensury, a six-rowed sort, was tried. The varieties used were as follows: 1889 to 1891, Saale; 1892, Goldthorpe; 1893, Duckbill; and in 1894 to 1901, Canadian Thorpe, a selected form of the Duckbill. Since 1902 Mensury has been sown. In 1906 it was sown May 3, and was harvested on July 30.

TABLE II.
EXPERIMENTS WITH FERTILIZERS ON PLOTS OF BARLEY.

No. of Plot.	Fertilizers applied each year from 1889 to 1898 or 1899. No fertilizers used from that time to 1905. Clover sown in 1899 and each year after to 1905 with the grain and ploughed under in the autumn. In 1905-6 fertilizers again applied as in 1898. Clover discontinued.	Average Yield for Seventeen Years.			18th Season, 1906. Variety, Mensury.			Average Yield for Eighteen Years.		
		Yield of Grain. Per acre.		Yield of Straw. Per acre	Yield of Grain. Per acre.		Yield of Straw. Per acre	Yield of Grain. Per acre.		Yield of Straw. Per acre
		Bush.	lbs.	Lbs.	Bush.	lbs.	Lbs.	Bush.	lbs.	Lbs.
1	Barn-yard manure, well rotted, 15 tons per acre each year to 1898, inclusive. No manure used from 1899 to 1905. In 1905-6 15 tons per acre again used.............	37	$5\frac{15}{17}$	3042	49	18	3930	37	$38\frac{10}{18}$	3086
2	Barn-yard manure, fresh, 15 tons per acre each year to 1898, inclusive. No manure used from 1899 to 1905. In 1905-6 15 tons per acre again used....	37	$4\frac{4}{17}$	3187	53	16	3900	37	$47\frac{10}{18}$	3228
3	Unmanured from the beginning....	15	$10\frac{3}{17}$	1545	27	24	1170	15	$42\frac{15}{18}$	1525
4	Mineral phosphate, untreated, finely ground 500 lbs. per acre, used each year from 1888 to 1897, inclusive. In 1898 and 1899 a similar weight of the Thomas phosphate was used. No fertilizer used from 1900 to 1905. In 1905-6 fertilizer again used as in 1899...........	16	46	1598	28	6	1820	17	$27\frac{10}{18}$	1610
5	Mineral phosphate, untreated, finely ground 500 lbs., nitrate of soda, 200 lbs. per acre, used each year from 1888 to 1897, inclusive. In 1898 and 1899 500 lbs. of the Thomas phosphate were used in place of the mineral phosphate. No fertilizers used from 1900 to 1905. In 1905-6 fertilizers again used as in 1899....................	22	10	2245	38	16	2400	23	5	2253
6	Barn-yard manure, partly rotted and actively fermenting, 6 tons per acre, mineral phosphate, untreated, finely ground 500 lbs. per acre, composted together, intimately mixed and allowed to heat for several days before using, applied each year from 1888 to 1897, inclusive. In 1898 500 lbs. of the Thomas phosphate were used in place of the mineral phosphate. No fertilizers used from 1899 to 1905. In 1905-6 fertilizers again used as in 1898	30	$26\frac{10}{17}$	2463	46	12	2900	31	$2\frac{5}{18}$	2487
7	Mineral phosphate, untreated, finely ground 500 lbs., nitrate of soda, 200 lbs., wood ashes, unleached, 1,000 lbs. per acre, used each year from 1888 to 1897, inclusive. In 1898 and 1899, 500 lbs. of the Thomas phosphate was used in place of the mineral phosphate. No fertilizers used from 1900 to 1905. In 1905-6 fertilizers again used as in 1899........................	28	$2\frac{11}{17}$	2446	51	2	3190	29	$15\frac{17}{18}$	2487

TABLE II.—EXPERIMENTS WITH FERTILIZERS ON PLOTS OF BARLEY—*Concluded.*

No. of Plot.	Fertilizers applied each year from 1889 to 1898 or 1899. No fertilizers used from that time to 1905. Clover sown in 1899 and each year after to 1905 with the grain and ploughed under in the autumn. In 1905-6 fertilizers again applied as in 1898. Clover discontinued.	Average Yield for Seventeen Years.			18th Season, 1906. Variety, Mensury.			Average Yield for Eighteen Years.		
		Yield of Grain.		Yield of Straw.	Yield of Grain.		Yield of Straw.	Yield of Grain.		Yield of Straw.
		Per acre.		Per acre	Per acre.		Per acre	Per acre.		Per acre
		Bush.	lbs.	Lbs.	Bush.	lbs.	Lbs.	Bush.	lbs.	Lbs.
8	Mineral phosphate, untreated, finely ground, 500 lbs., wood ashes, unleached, 1,500 lbs. per acre, used each year from 1888 to 1897, inclusive. In 1898 and 1899, 500 lbs. of the Thomas phosphate were used in place of the mineral phosphate. No fertilizers used from 1900 to 1905. In 1905-6 fertilizers again used as in 1899..........	23	$31\frac{10}{17}$	1901	39	8	2320	24	$25\frac{13}{18}$	1924
9	Mineral superphosphate, No. 1, 500 lbs. per acre used each year from 1888 to 1899, inclusive. No fertilizer used from 1900 to 1905. In 1905-6 fertilizer again used as in 1899......	22	$47\frac{4}{17}$	1780	33	42	2110	23	$28\frac{5}{18}$	1798
10	Mineral superphosphate, No. 1, 350 lbs., nitrate of soda, 200 lbs. per acre, used each year from 1888 to 1899, inclusive. No fertilizers used from 1900 to 1905. In 1905-6 fertilizers again used as in 1899...	28	$41\frac{15}{17}$	2382	38	6	2680	29	$19\frac{2}{18}$	2398
11	Mineral superphosphate, No. 1, 350 lbs., nitrate of soda, 200 lbs., wood ashes, unleached, 1,500 lbs. per acre, used each year from 1888 to 1899, inclusive. No fertilizers used from 1900 to 1905. In 1905-6 fertilizers again used as in 1899...	28	$20\frac{12}{17}$	2504	41	42	3000	29	$8\frac{10}{18}$	2531
12	Unmanured from the beginning...........	15	$2\frac{11}{17}$	1278	28	16	1100	15	$38\frac{1}{18}$	1269
13	Bone, finely ground, 500 lbs. per acre, used each year from 1888 to 1899, inclusive. No fertilizer used from 1900 to 1905. In 1905-06 bone again used as at first	16	$41\frac{2}{17}$	1436	31	42	1220	17	$32\frac{3}{18}$	1424
14	Bone, finely ground, 500 lbs., wood ashes, unleached, 1,500 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizers used from 1900 to 1905. In 1905-6 fertilizers again used as at first...	25	$25\frac{5}{17}$	2151	32	34	2420	25	$44\frac{8}{18}$	2166
15	Nitrate of soda, 200 lbs. per acre, used each year from 1888 to 1899, inclusive. No fertilizer used from 1900 to 1905. In 1905-6 fertilizer again used as at first....	22	$16\frac{1}{17}$	2211	33	26	2070	22	$45\frac{17}{18}$	2203
16	Muriate of potash, 150 lbs. per acre, used each year from 1888 to 1899, inclusive. No fertilizer used from 1900 to 1905. In 1905-6 fertilizer again used as at first....	23	$18\frac{11}{17}$	1847	35	20	1260	24	$2\frac{13}{18}$	1815
17	Sulphate of ammonia, 300 lbs. per acre, used each year from 1888 to 1899, inclusive. No fertilizer used from 1900 to 1905. In 1905-6 fertilizer again used as at first....	20	$8\frac{1}{17}$	1905	32	14	1460	20	$40\frac{7}{18}$	1880
18	Sulphate of iron, 60 lbs. per acre, used each year from 1888 to 1899, inclusive. No fertilizer used from 1900 to 1905. In 1905-6 fertilizer again used as at first....	19	$42\frac{12}{17}$	1630	36	32	1020	20	$39\frac{8}{18}$	1596
19	Common salt (Sodium chloride) 300 lbs. per acre used each year from 1888 to 1899, inclusive. No fertilizer used from 1900 to 1905. In 1905-6 fertilizer again used as at first.	28	$6\frac{15}{17}$	1869	33	36	2140	28	$21\frac{15}{18}$	1884
20	Land plaster or gypsum (Calcium sulphate), 300 lbs. per acre, used each year from 1888 to 1899, inclusive. No fertilizer used from 1900 to 1905. In 1905-6 fertilizer again used as at first................ .	21	12	1613	34	38	840	22	$8\frac{6}{18}$	1570
21	Mineral superphosphate, 500 lbs. per acre, used each year from 1889 to 1899, inclusive. No fertilizer used from 1900 to 1905. In 1905-6 fertilizer again used as at first............	22	16	1770	31	42	840	22	$41\frac{5}{18}$	1717

OAT PLOTS.

The quantity of seed sown per acre on the oat plots was about 2 bushels in 1889 and 1890; 1½ bushels in 1891 to 1893, and 2 bushels from 1894 to 1906, inclusive. The varieties used were as follows: in 1889, Early English; in 1890 to 1893, Prize Cluster; and from 1894 to 1906, inclusive, the Banner. In 1906 Banner was sown May 3 and the plots were harvested August 19.

TABLE III.

EXPERIMENTS WITH FERTILIZERS ON PLOTS OF OATS.

No. of Plot.	Fertilizers applied each year from 1889 to 1898 or 1899. No fertilizers used from that time to 1905. Clover sown in 1899 and each year after to 1905 with the grain and ploughed under in the autumn. In 1905-6 fertilizers again applied as in 1898. Clover discontinued.	Average Yield for Seventeen Years.			18th Season, 1906. Variety, Banner.			Average Yield for Eighteen Years.		
		Yield of Grain.		Yield of Straw.	Yield of Grain.		Yield of Straw.	Yield of Grain.		Yield of Straw.
		Per acre.		Per acre	Per acre.		Per acre	Per acre.		Per acre
		Bush.	lbs.	Lbs.	Bush.	lbs.	Lbs.	Bush.	lbs.	Lbs.
1	Barn-yard manure, well rotted, 15 tons per acre each year to 1898, inclusive. No manure used from 1899 to 1905. In 1905-6 15 tons per acre were again used.........	52	$15\frac{4}{17}$	3229	50	10	3590	52	$11\frac{3}{18}$	3249
2	Barn-yard manure, fresh, 15 tons per acre each year to 1898, inclusive. No manure used from 1899 to 1905. In 1905-6 15 tons per acre were again used.	56	$3\frac{11}{17}$	3370	53	8	3550	56	$0\frac{2}{18}$	3380
3	Unmanured from the beginning...........	35	$11\frac{8}{17}$	1773	35	20	1490	35	$11\frac{17}{18}$	1757
4	Mineral phosphate, untreated, finely ground, 500 lbs. per acre, used each year from 1888 to 1897, inclusive. In 1898 and 1899 a similar weight of the Thomas phosphate was used. No fertilizer used from 1900 to 1905. In 1905-6 fertilizer again used as in 1899..............	36	$27\frac{5}{17}$	1925	39	14	2530	36	$31\frac{6}{18}$	1958
5	Mineral phosphate, untreated, finely ground, 500 lbs., nitrate of soda, 200 lbs. per acre, used each year from 1888 to 1897, inclusive. In 1898 and 1899, 500 lbs. of the Thomas phosphate were used in place of the mineral phosphate. No fertilizers used from 1900 to 1905. In 1905-6 fertilizers again used as in 1899	49	$12\frac{14}{17}$	2673	50	20	4190	49	$15\frac{2}{18}$	2752
6	Barn-yard manure, partly rotted and actively fermenting, 6 tons per acre, mineral phosphate, untreated, finely ground, 500 lbs. per acre, composted together, intimately mixed and allowed to heat for several days before using, applied each year from 1888 to 1897, inclusive. In 1898 500 lbs, of Thomas phosphate were used in place of the mineral phosphate. No fertilizers used from 1899 to 1905. In 1905-6 fertilizers again used as in 1898...	49	$21\frac{11}{17}$	2798	42	2	2880	49	$7\frac{6}{18}$	2802
7	Mineral phosphate, untreated, finely ground, 500 lbs., nitrate of soda, 200 lbs., wood ashes, unleached, 1,000 lbs. per acre, used each year from 1888 to 1897, inclusive. In 1898 and 1899, 500 lbs. of the Thomas phosphate were used in place of the mineral phosphate. No fertilizers used from 1900 to 1905. In 1905-6 fertilizers again used as in 1899..........................	49	$30\frac{11}{17}$	3132	40	10	3030	49	$12\frac{9}{18}$	3135
8	Mineral phosphate, untreated, finely ground, 500 lbs. wood ashes, unleached, 1,500 lbs. per acre used each year from 1888 to 1897, inclusive. In 1898 and 1899, 500 lbs. of Thomas' phosphate were used in place of the mineral phosphate. No fertilizers used from 1900 to 1905. In 1905-6 fertilizers again used as in 1899.........	45	$2\frac{1}{17}$	2584	36	7	2540	44	$19\frac{5}{18}$	25[illegible]6

EXPERIMENTS WITH FERTILIZERS ON PLOTS OF OATS—*Concluded.*

No. of Plot.	Fertilizers applied each year, from 1889 to 1898 or 1899. No fertilizers used from that time to 1905. Clover sown in 1899 and each year after to 1905 with the grain and ploughed under in the autumn. In 1905 fertilizers again applied as in 1898. Clover discontinued.	Average Yield for Seventeen Years.			18th Season, 1906. Variety, Banner.			Average Yield for Eighteen Years.		
		Yield of Grain.		Yield of Straw.	Yield of Grain.		Yield of Straw.	Yield of Grain.		Yield of Straw.
		Per acre.		Per acre	Per acre.		Per acre.	Per acre.		Per acre
		Bush.	lbs.	Lbs.	Bush.	lbs.	Lbs.	Bush.	lbs.	Lbs.
9	Mineral superphosphate, No. 1, 500 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizer used from 1900 to 1905. In 1905-6 fertilizer again used as in 1899	39	$19\frac{10}{17}$	2004	31	16	2440	39	$4\frac{5}{18}$	2027
10	Mineral superphosphate, No. 1, 350 lbs., nitrate of soda, 200 lbs. per acre, used each year from 1888 to 1899, inclusive. No fertilizers used from 1900 to 1905. In 1905-6 fertilizers again used as in 1899	48	$0\frac{16}{17}$	2576	39	24	2950	47	$19\frac{4}{18}$	2597
11	Mineral superphosphate, No. 1, 350 lbs., nitrate of soda, 200 lbs., wood ashes unleached, 1,500 lbs. per acre, used each year from 1888 to 1899, inclusive. No fertilizers used from 1900 to 1905. In 1905-6 fertilizers again used as in 1899	39	$18\frac{4}{17}$	2426	33	18	2160	39	$6\frac{16}{18}$	2411
12	Unmanured from the beginning	24	$21\frac{6}{17}$	1442	13	28	2430	24	$0\frac{17}{18}$	1497
13	Bone, finely ground, 500 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizer used from 1900 to 1905. In 1905-6 bone again used as at first	36	$12\frac{8}{17}$	2015	32	12	1410	36	$4\frac{11}{18}$	1982
14	Bone, finely ground, 500 lbs., wood ashes, unleached, 1,500 lbs. per acre, used each year from 1888 to 1899, inclusive. No fertilizers used from 1900 to 1905. In 1905-6 fertilizers used again as at first	41	$28\frac{12}{17}$	2340	38	28	1910	41	$22\frac{8}{18}$	2316
15	Nitrate of soda, 200 lbs. per acre, used each year from 1888 to 1899, inclusive. No fertilizer used from 1900 to 1905. In 1905-6 fertilizer used again as at first	47	$14\frac{16}{17}$	2746	37	22	1900	46	$30\frac{8}{18}$	2699
16	Muriate of potash, 150 lbs. per acre, used each year from 1888 to 1899, inclusive. No fertilizer used from 1900 to 1905. In 1905-6 fertilizer again used as at first	41	$3\frac{16}{17}$	2241	39	14	1710	41	$0\frac{13}{18}$	2211
17	Sulphate of ammonia, 300 lbs. per acre, used each year from 1888 to 1899, inclusive. No fertilizer used from 1900 to 1905. In 1905-6 fertilizer again used as at first	46	$24\frac{7}{17}$	2752	43	28	2850	46	$18\frac{17}{18}$	2757
18	Sulphate of iron, 60 lbs. per acre, used each year from 1888 to 1899, inclusive. No fertilizer used from 1900 to 1905. In 1905-6 fertilizer again used as at first	39	$31\frac{16}{17}$	2064	39	24	1910	39	$31\frac{9}{18}$	2055
19	Common salt (Sodium chloride), 300 lbs. per acre, used each year from 1888 to 1899, inclusive. No fertilizer used from 1900 to 1905. In 1905-6 fertilizer used again as at first	40	$0\frac{5}{17}$	2007	42	32	2410	40	$5\frac{15}{18}$	2029
20	Land plaster or gypsum (Calcium sulphate), 300 lbs. per acre, used each year from 1888 to 1899, inclusive. No fertilizer used from 1900 to 1905. In 1905-6 fertilizer again used as at first	36	$20\frac{2}{17}$	2066	40	10	2230	36	$27\frac{2}{18}$	2075
21	Mineral superphosphate, 500 lbs. per acre, used each year from 1889 to 1899, inclusive. No fertilizer used from 1900 to 1905. In 1905-6 fertilizer again used as at first	37	$15\frac{14}{17}$	1912	43	18	2370	37	$27\frac{5}{18}$	1938

The one-tenth acre plots of wheat, barley and oats had by the end of 1903 become infested with several troublesome perennial weeds, hence it was thought best to sow only one-half of each plot with grain in 1904, devoting the other half to a hoed crop to clean the land. On this account no clover was sown on any of the cereal plots in 1904, and one-half of the wheat plots was sown with mangels, one-half of the barley plots with potatoes, and one-half of the oat plots with carrots, computing the yields of grain from a one-twentieth acre plot in each case. Similar hoed crops were sown in 1905 and 1906 changing the position of the varieties from year to year.

INDIAN CORN PLOTS.

The experiments with the plots of Indian corn have been conducted with the object of obtaining the largest weight of well matured green fodder for the silo, and to have the corn so far advanced when cut, that the ears shall be as far as is practicable in the late milk or glazed condition. Each plot has been divided from the outset into two equal parts, on one of which—known as No. 1—one of the stronger growing and somewhat later ripening sorts has been tried, and on the other, marked No. 2, one of the earlier maturing varieties. During the first four years one of the Dent varieties was tested under No. 1. On the other half of the plot (No. 2) one of the Flint varieties was grown. For the first four years the No. 1 series was planted in drills 3 feet apart, using about 24 pounds of seed to the acre and thinning the plants, when up, to 6 or 8 inches, and the No. 2 in hills 3 feet apart each way with 4 or 5 kernels in a hill. During the past eight years both sorts have been grown in hills.

In 1900 no crop of Indian corn was grown on these plots, but clover was sown in its place on May 5, in the proportion of 12 pounds per acre. This made a strong growth, was cut twice during the season and left on the ground to decay, so that when ploughed under, the land might get the full benefit of the clover crop. The clover was allowed to remain growing until May 20, 1901. It was then ploughed under about 6 inches deep, and harrowed well before the corn was planted. Clover was sown again in 1903, and ploughed under in May, 1904. Corn was planted in 1905 and 1906. In 1906 it was planted on May 28, and cut for ensilage September 13.

EXPERIMENTS WITH FERTILIZERS ON PLOTS OF INDIAN CORN, CUT GREEN FOR ENSILAGE.

No. of Plot.	Fertilizers applied each year from 1888 to 1898 or 1899. No fertilizers used from that time to 1905. Clover sown in 1900 in place of the corn and ploughed under in May, 1901, before the corn was planted. In 1903 clover was again sown and ploughed under in May, 1904. In 1905-6 fertilizers again applied as in 1898. Clover discontinued.	Average Yield for Fourteen Years.				15th Season, 1906,				Average Yield for Fifteen Years.			
		½ Plot No. 1—weight of green fodder.		½ Plot No. 2—weight of green fodder.		½ Plot No. 1—Selected Leaming, weight of green fodder.		½ Plot No. 2—Angel of Midnight, weight of green fodder.		½ Plot No. 1—weight of green fodder.		½ Plot No. 2—weight of green fodder.	
		Per acre.		Per acre		Per acre.		Per acre		Per acre.		Per acre	
		Tons.	lbs.	Tons	lbs	Tons.	lbs.	Tons	lbs	Tons.	lbs.	Tons	lbs
1	Barn-yard manure (mixed horse and cow manure) well rotted, 12 tons per acre, each year from 1888 to 1898 inclusive. No manure used from 1899 to 1905. In 1905-6 manure was again used as at first.	16	1076	13	634	14	180	12	1700	16	750	13	320
2	Barn-yard manure (nixed horsee and cow manure) fresh, 12 tons per acre each year from 1888 to 1898 inclusive. No manure used from 1899 to 1905. In 1905-6 manure was again used as at first......	16	809	11	1636	13	1850	12	30	15	1145	11	1662
3	Unmanured from the beginning..........	7	258	5	1077	2	1640	2	1400	6	1684	5	689

EXPERIMENTS WITH FERTILIZERS ON PLOTS OF INDIAN CORN.

No. of Plot.	Fertilizers applied each year from 1888 to 1898 or 1899. No fertilizers used from that time to 1905. Clover sown in 1900 in place of the corn and ploughed under in May, 1901, before the corn was planted. In 1903 clover was again sown and ploughed under in May, 1904. In 1905-6 fertilizers again applied as in 1898. Clover discontinued.	AVERAGE YIELD FOR FOURTEEN YEARS.				15TH SEASON, 1906.				AVERAGE YIELD FOR FIFTEEN YEARS.			
		½ Plot No. 1—weight of green fodder.		½ Plot No. 2—weight of green fodder.		½ Plot No. 1—Selected Leaming, weight of green fodder.		½ Plot No. 2—Angel of Midnight, weight of green fodder.		½ Plot No. 1—weight of green fodder.		½ Plot No. 2—weight of green fodder.	
		Per acre.		Per acre		Per acre.		Per acre		Per acre.		Per acre	
		Tons.	lbs.	Tons.	lbs	Tons.	lbs.	Tons.	lbs	Tons.	lbs.	Tons.	lbs
4	Mineral phosphate, untreated, finely ground, 800 lbs. per acre, used each year from 1888 to 1897 inclusive. In 1898 and 1899 a similar weight of the Thomas phosphate was used. No fertilizer used from 1900 to 1905. In 1905-6 fertilizer again used as in 1899..........	8	770	5	1567	8	550	6	1170	8	755	5	1674
5	Mineral phosphate, untreated, finely ground, 800 lbs., nitrate of soda, 200 lbs. per acre, used each year from 1888 to 1897 inclusive. In 1898 and 1899, 800 lbs. of the Thomas' phosphate were used in place of the mineral phosphate. No fertilizers used from 1900 to 1905. In 1905-6 fertilizers again used as in 1899.............	11	1721	9	1014	10	1010	9	790	11	1540	9	999
6	Barn-yard manure, partly rotted and actively fermenting, 6 tons per acre, mineral phosphate, untreated, finely ground, 500 lbs. per acre, composted together, intimately mixed and allowed to heat for several days before using, applied each year from 1888 to 1897 inclusive. In 1898, 500 lbs. of Thomas' phosphate were used in place of the mineral phosphate. No fertilizers used from 1899 to 1905. In 1905-6 fertilizers again used as in 1898.........	16	334	12	421	13	960	10	1450	15	1975	12	223
7	Mineral phosphate, untreated, finely ground, 500 lbs., nitrate of soda, 200 lbs., wood ashes, unleached, 1,000 lbs. per acre, used each year from 1888 to 1897 inclusive. In 1898 and 1899, 500 lbs. of the Thomas' phosphate were used in place of the mineral phosphate. No fertilizers used from 1900 to 1905. In 1905-6 fertilizers again used as in 1899......................	15	348	11	826	11	750	9	1400	14	1841	11	598
8	Mineral phosphate, untreated, finely ground, 500 lbs., wood ashes, unleached, 1,500 lbs. per acre, used each year from 1888 to 1897 inclusive. In 1898 and 1899 500 lbs. of the Thomas' phosphate were used in place of the mineral phosphate. No fertilizers used from 1900 to 1905. In 1905-6 fertilizers again used as in 1899............	12	892	9	1726	10	990	8	1910	12	631	9	1605
9	Mineral superphosphate, No. 1, 500 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizer used from 1900 to 1905. In 1905-6 fertilizer again used as in 1899..............................	11	1048	8	1876	9	1300	6	1840	11	791	8	1607
10	Mineral superphosphate, No. 1, 350 lbs., nitrate of soda, 200 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizers used from 1900 to 1905. In 1905-6 fertilizers again used as in 1899...	13	1116	10	1261	8	1340	7	880	13	464	10	836
11	Mineral superphosphate, No. 1, 350 lbs., nitrate of soda, 200 lbs., wood ashes, unleached, 1,500 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizers used from 1900 to 1905. In 1905-6 fertilizers again used as in 1899...	16	545	12	1130	12	50	10	300	15	1979	12	808

EXPERIMENTS WITH FERTILIZERS ON PLOTS OF INDIAN CORN—*Concluded.*

No. of Plot.	Fertilizers applied each year from 1888 to 1898 or 1899. No fertilizers used from that time to 1905. Clover sown in 1900 in place of the corn and ploughed under in May, 1901, before the corn was planted. In 1903 clover was again sown and ploughed under in May, 1904. In 1905-06 fertilizers again applied as in 1898. Clover discontinued.	Average Yield for Fourteen Years.				15th Season, 1906.				Average Yield for Fifteen Years.			
		⅒ Plot No. 1—weight of green fodder.		⅒ Plot No. 2—weight of green fodder.		⅒ Plot No. 1—Selected Leaming, weight of green fodder.		⅒ Plot No. 2—Angel of Midnight, weight of green fodder.		⅒ Plot No. 1—weight of green fodder.		⅒ Plot No. 2—weight of green fodder.	
		Per acre.		Per acre		Per acre.		Per acre		Per acre.		Per acr	
		Tons.	lbs.	Tons	lbs	Tons.	lbs.	Tons	lbs	Tons.	lbs.	Tons	lb
12	Unmanured from the beginning..........	11	86	9	466	8	1100	6	300	10	1755	9	5
13	Bone, finely ground, 500 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizer used from 1900 to 1905. In 1905-6 bone again used as at first........	12	722	9	1559	9	1400	6	1550	12	367	9	115
14	Bone, finely ground, 500 lbs., wood ashes, unleached, 1,500 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizers used from 1900 to 1905. In 1905-6 fertilizers again used as at first....	13	213	10	647	11	10	8	1180	12	1933	10	41
15	Nitrate of soda, 200 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizer used from 1900 to 1905. In 1905-6 fertilizer again used as at first....	12	1075	9	1633	8	1060	6	910	12	541	9	118
16	Sulphate of ammonia, 300 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizer used from 1900 to 1905. In 1905-6 fertilizer again used as at first..	13	144	10	442	8	1290	7	540	12	1554	10	4
17	Mineral superphosphate, No. 1, 600 lbs., muriate of potash 200 lbs., sulphate of ammonia, 150 lbs. per acre, used each year from 1889 to 1899 inclusive. No fertilizer used from 1900 to 1905. In 1905-6 fertilizer again used as at first....	13	1251	10	639	11	1510	9	10	13	1002	10	46
18	Muriate of potash, 300 lbs. per acre, used each year from 1889 to 1899 inclusive. No fertilizer used from 1900 to 1905. In 1905-6 fertilizer again used as at first ...	10	783	7	1698	9	1810	8	270	10	718	7	173
19	Double sulphate of potash and magnesia, 300 lbs. per acre in 1889 and 1890, (muriate of potash 200 lbs., substituted, each year since), dried blood, 300 lbs., mineral superphosphate, No. 1, 500 lbs. per acre, used each year from 1889 to 1899 inclusive. No fertilizers used from 1900 to 1905. In 1905-6 fertilizers again used as at first..............	12	1203	9	812	12	1360	10	500	12	1213	9	92
20	Wood ashes unleached, 1,900 lbs. per acre, used each year from 1889 to 1899 inclusive. No fertilizer used from 1900 to 1905. In 1905-6 fertilizer again used as at first..............................	11	800	8	1763	9	960	8	530	11	544	8	168
21	Bone, finely ground, 500 lbs., sulphate of ammonia, 200 lbs., muriate of potash, 200 lbs. per acre, used each year from 1889 to 1899 inclusive. No fertilizers used from 1900 to 1905. In 1905-6 fertilizers again used as at first................	12	1588	8	422	8	1640	7	127	12	1058	8	3

PLOTS OF MANGELS AND TURNIPS.

In conducting these experiments, the roots only have been taken from the lan the tops have always been cut off and left on the ground to be ploughed under, so th the plant food they have taken from the soil has been returned to it. One half of eac one-tenth acre plot in the series has been devoted to the growth of mangels, and th other half to turnips, and these crops have been alternated from year to year. Th preparation of the land has been the same for both these roots. Until 1900 it was ploughed in the autumn after the crop was gathered, gang-ploughed deeply in the spring after the barn-yard manure had been spread on plots 1, 2 and 6, and after gang-ploughing, the other fertilizers were spread by scattering them evenly over the surface, after which it was all harrowed with the smoothing harrow, then made in ridges 2 feet apart, rolled and sown.

The variety of mangel principally grown was the Mammoth Long Red, and four pounds of seed were sown per acre each year.

The variety of turnip chiefly sown was the Prize Purple Top Swede. The land used for the turnips, which are usually sown later than the mangels, was prepared in the same manner as for the mangels. It was then allowed to stand until the day before sowing, when it was gang-ploughed shallow or cultivated to kill weeds and loosen the soil, ridged, rolled and sown. About 3 pounds of seed were sown per acre.

In 1900 and 1903, no crops of mangels or turnips were grown but clover was sown in their place in May in the proportion of 12 pounds per acre. This made a strong growth and was cut twice each year during the season, and left on the ground to decay, so that when ploughed under, the land might get the full benefit of the clover crop. The clover was allowed to remain growing until near the middle of May, the year following, by which time it had made a very heavy growth. It was then ploughed under about 6 inches deep and harrowed well, then made into ridges 2 feet apart. These were rolled with a hand roller, which flattened the ridges considerably and made a firm, even seed bed. The crops of clover and roots were alternated in this way, for the purpose of supplying humus and also of gaining information as to the fertilizing effect of green clover ploughed under on land to be used for growing roots.

In 1906, the mangels were sown on May 8, and pulled on October 29; the turnips were sown May 14, and pulled October 30. The yield per acre has been calculated in each case from the weight of roots gathered from the whole plot.

EXPERIMENTS WITH FERTILIZERS ON PLOTS OF MANGELS AND TURNIPS.

No. of Plot.	Fertilizers applied each year from 1889 to 1898 or 1899. No fertilizers used from that time to 1905. Clover sown in 1900 in place of the roots and ploughed under in May, 1901, before the roots were sown. In 1903 clover was again sown and ploughed under in May, 1904. In 1905 and 1906 fertilizers again applied as in 1899. Clover discontinued.	Average Yield for Fourteen Years.				15th Season, 1906. Varieties.				Average Yield for Fifteen Years.			
						West Half Plot.		East Half Plot.					
		Mangels, Weight of Roots.		Turnips, Weight of Roots.		Turnips: Purple Top, Swede. Weight of Roots.		Mangels: Mammoth Long Red. Weight of Roots.		Mangels. Weight of Roots.		Turnips. Weight of Roots.	
		Per acre.		Per acre.		Per acre.		Per acre.		Per acre.		Per acre.	
		Tons.	lbs.	Tons.	lbs.	Tons.	lbs.	Tons.	lbs.	Tons	lbs.	Tons.	lbs.
1	Barn-yard manure (mixed horse and cow manure) well rotted, 20 tons per acre each year from 1889 to 1898 inclusive. No manure used from 1899 to 1905. In 1905-6 manure was again used as at first.	22	358	15	1397	11	640	21	1680	22	313	15	813
2	Barn-yard manure (mixed horse and cow manure) fresh, 20 tons per acre each year from 1889 to 1898 inclusive. No manure used from 1899 to 1905. In 1905-6 manure was again used as at first	21	423	15	1467	10	1500	21	1520	21	497	15	863
3	Unmanured from the beginning	8	1949	7	998	4	460	8	1560	8	1923	7	562
4	Mineral phosphate, untreated, finely ground, 1,000 lbs. per acre, used each year from 1889 to 1897, inclusive. In 1898 and 1899 a similar weight of the Thomas' phosphate was used. No fertilizer used from 1900 to 1905. In 1905-6 fertilizer again used as in 1899.	8	1922	8	649	6	160	7	380	8	1686	8	350

EXPERIMENTS WITH FERTILIZERS ON PLOTS OF MANGELS AND TURNIPS—*Continue*

No. of Plot.	Fertilizers applied each year from 1889 to 1898 or 1899. No fertilizers used from that time to 1905. Clover sown in 1900 in place of the roots and ploughed under in May, 1901, before the roots were sown. In 1903 clover was again sown and ploughed under in May, 1904. In 1905-6 fertilizers again applied as in 1899. Clover discontinued.	Average Yield for Fourteen Years.				15th Season, 1906, Varieties.				Average Yield for Fifteen Years.			
		Mangels, Weight of Roots.		Turnips, Weight of Roots.		West Half Plot. Turnips: Purple Top Swede Weight of Roots.		East Half Plot. Mangels: Mammoth Long Red. Weight of Roots.		Mangels. Weight of Roots.		Turnips Weigh of Roots	
		Per acre.		Per acre.		Per acre.		Per acre.		Per acre.		Per acre	
		Tons.	lbs.	Tons.	lbs.	Tons.	lbs.	Tons.	lbs.	Tons.	lbs.	Tons.	lb
5	Mineral phosphate, untreated, finely ground, 1,000 lbs., nitrate of soda, 250 lbs., wood ashes, unleached, 1,000 lbs. per acre, used each year from 1889 to 1897 inclusive. In 1898 and 1899 500 lbs. of Thomas phosphate were used in place of the mineral phosphate. No fertilizers used from 1900 to 1905. In 1905-6 fertilizers again used as in 1899....	14	1824	10	470	9	1420	18	40	15	238	10	4
6	Barn-yard manure, partly rotted and actively fermenting, 6 tons per acre, mineral phosphate, untreated, finely ground, 1,000 lbs. per acre, composted together, intimately mixed and allowed to heat for several days before using, applied each year from 1889 to 1897 inclusive. In 1898 1,000 lbs. of Thomas phosphate were used in place of the mineral phosphate. No fertilizers used from 1899 to 1905. In 1905-6 fertilizers again used as in 1898....	17	1934	12	1893	7	1120	15	1920	17	1666	12	11
7	Mineral phosphate, untreated, finely ground, 1,000 lbs., sulphate of potash, 200 lbs. in 1889 and 1890 (substituted by muriate of potash, 250 lbs. in 1891 and subsequent years), nitrate of soda, 200 lbs. per acre, used each year from 1889 to 1897 inclusive. In 1898 and 1899 1,000 lbs. of the Thomas phosphate were used in place of the mineral phosphate. No fertilizers used from 1900 to 1905. In 1905-6 fertilizers again used as in 1899......	12	243	9	1191	7	1800	20	100	12	1300	9	9
8	Mineral superphosphate, No. 1, 500 lbs., sulphate of potash, 200 lbs. in 1889 and 1890 (substituted by muriate of potash, 250 lbs. in 1891 and subsequent years), nitrate of soda, 200 lbs. per acre, used each year from 1889 to 1899 inclusive. No fertilizers used from 1900 to 1905. In 1905-6 fertilizers again used as in 1899	14	242	11	1175	10	240	16	1280	14	578	11	9
9	Mineral superphosphate, No. 1, 500 lbs. per acre, used each year from 1889 to 1899 inclusive. No fertilizer used from 1900 to 1905. In 1905-6 fertilizer again used as in 1899....	10	313	9	991	5	1140	7	1100	9	1996	9	4
10	Nitrate of soda, 300 lbs. per acre, used each year from 1889 to 1899, inclusive. No fertilizer used from 1900 to 1905. In 1905-6 fertilizer used again as in 1899.	14	738	9	892	7	930	12	80	14	427	9	6
11	Sulphate of ammonia, 300 lbs. per acre, used each year from 1889 to 1899 inclusive. No fertilizer used from 1900 to 1905. In 1905-6 fertilizer used again as in 1899.......	12	743	10	1358	8	1860	11	1040	12	629	10	11

EXPERIMENTS WITH FERTILIZERS ON PLOTS OF MANGELS AND TURNIPS—*Concluded.*

No. of Plot.	Fertilizers applied each year from 1889 to 1898 or 1899. No fertilizers used from that time to 1905. Clover sown in 1900 in place of the roots and ploughed under in May, 1901, before the roots were sown. In 1903 clover was again sown and ploughed under in May, 1904. In 1905-6 fertilizers again applied as in 1899. Clover discontinued.	Average Yield for Fourteen Years.				15th Season, 1906, Varieties.				Average Yield for Fifteen Years.			
		Mangels, Weight of Roots.		Turnips, Weight of Roots.		West Half Plot. Turnips: Purple Top Swede Weight of Roots.		East Half Plot. Mangels: Mammoth Long Red. Weight of Roots.		Mangels. Weight of Roots.		Turnips. Weight of Roots.	
		Per acre.		Per acre.		Per acre.		Per acre.		Per acre.		Per acre.	
		Tons.	lbs.	Tons.	lbs.	Tons.	lbs.	Tons.	lbs.	Tons.	lbs.	Tons.	lbs.
12	Unmanured from the beginning.....	7	918	7	675	4	1740	7	40	7	859	7	346
13	Bone, finely ground, 500 lbs., wood ashes, unleached, 1,000 lbs. per acre, used each year from 1889 to 1899 inclusive. No fertilizers used from 1900 to 1905. In 1905-6 fertilizers again used as at first........	12	571	8	1989	7	240	15	200	12	946	8	1739
14	Wood ashes, unleached, 2,000 lbs. per acre, used each year from 1889 to 1899, inclusive. No fertilizer used from 1900 to 1905. In 1905-6 fertilizer again used as at first....	11	422	8	1077	5	760	12	1980	11	659	8	656
15	Common salt (Sodium chloride), 400 lbs. per acre, used each year from 1889 to 1899 inclusive. No fertilizer used from 1900 to 1905. In 1905-6 fertilizer again used as at first....	10	256	8	270	2	1600	9	1020	10	174	7	1558
16	Mineral superphosphate, No. 1, 500 lbs., nitrate of soda, 200 lbs. per acre, used each year from 1889 to 1899 inclusive. No fertilizers used from 1900 to 1905. In 1905-6 fertilizers again used as at first.......	12	1983	10	1884	7	1820	9	1680	12	1563	9	1897
17	Mineral superphosphate, No. 1, 350 lbs., wood ashes, unleached, 1,500 lbs. per acre, used each year from 1889 to 1899 inclusive. No fertilizers used from 1900 to 1905. In 1905-6 fertilizers again used as at first..............	13	1163	10	1319	8	20	10	200	13	699	10	966
18	Mineral superphosphate, No. 1, 500 lbs., muriate of potash, 200 lbs. per acre, used each year from 1889 to 1899 inclusive. No fertilizers used from 1900 to 1905. In 1905-6 fertilizers again used as at first ...	13	150	11	443	7	1100	15	1460	13	504	10	1943
19	Double sulphate of potash and magnesia, 300 lbs. per acre in 1889 and 1890 (muriate of potash, 200 lbs., substituted each year since), dried blood, 250 lbs., mineral superphosphate, No. 1, 500 lbs. per acre, used each year from 1889 to 1899 inclusive. No fertilizers used from 1900 to 1905. In 1905-6 fertilizers again used as at first......	14	800	12	299	6	1960	16	640	14	989	11	1610
20	Wood ashes, unleached, 1,500 lbs., common salt (Sodium chloride), 300 lbs. per acre, used each year from 1889 to 1899 inclusive. No fertilizers used from 1900 to 1905. In 1905-6 fertilizers again used as at first	15	214	10	1810	6	1020	17	650	15	510	10	1290
21	Mineral superphosphate, No. 2, 500 lbs. per acre, used each year from 1889 to 1899 inclusive. No fertilizer used from 1900 to 1905. In 1905-6 fertilizer again used as at first....	14	1977	11	382	5	1860	11	1180	14	1524	10	1680

FURTHER EXPERIMENTS IN GROWING FARM CROPS IN THE YUKON.

The experiments reported on last year have been continued with the kindly aid of the Royal Northwest Mounted Police. The seed was forwarded in cotton bags containing about 5 lbs. each. The officers and men of the police force have my warmest thanks for the kindly interest they have taken in this matter.

Through the courtesy of the Comptroller of the police force, Frederick White, C.M.G., I have been favoured with the following report:

WHITEHORSE, Y.T., November 1, 1906.

The Assistant Commissioner.
Royal North-West Mounted Police,
Dawson, Y.T.

SIR,—I have the honour to forward herewith reports showing the distribution made with the seeds received last spring from the Experimental Farm, Ottawa, together with copies of letters received from the different persons to whom they were distributed.

The season was an exceptionally bad one on account of the frequent frosts, we having had more or less heavy frost some nights in every summer month.

I have the honour to be, sir,
Your obedient servant,
A. E. SNYDER, *Supt.,*
Commanding 'H' Division.

DISTRIBUTION OF SEEDS RECEIVED FROM THE EXPERIMENTAL FARM.

To whom.	Place.	Date.	Varieties.
H. J. Biggar	Whitehorse	April 25th, 1906	1 sack Rochester Rose potatoes.
			1 „ barley, Odessa.
			1 „ oats, Ligowo.
			1 „ wheat.
Mrs. M. G. Watson	Whitehorse	April 25th, 1906	1 sack Rochester Rose potatoes.
			3 ozs. Rye grass seed.
			3 „ Timothy grass seed.
			3 „ Brome grass seed.
			3 „ Hungarian grass seed.
J. B. Saint	Whitehorse	April 26th, 1906	1 sack Rochester Rose.
			1 pkt. Timothy grass seed.
			1 „ Brome grass seed.
			1 „ Hungarian grass seed.
			1 „ Western Rye grass seed.
			1 „ barley.
Mrs. H. Gilchen	Whitehorse	April 26th, 1906	2 pkts. Western Rye grass.
Mrs. Harry Chapman	Whitehorse	April 26th, 1906	1 sack Brome grass seed.
			1 pkt. Timothy grass seed.
			1 „ Hungarian grass seed.
			1 „ Western Rye grass seed.
Mrs. J. E. Shermer	Ten Mile Point	May 4th, 1906	1 sack Improved Ligowo oats.
			1 bag Timothy seed.
			1 „ Hungarian grass.
			1 „ Brome grass seed.
			1 „ Western Rye grass.
			1 „ Preston wheat.
			1 „ barley.
			1 „ Rochester Rose potatoes.
R. N. W. M. P.	Whitehorse	May 11th, 1906	2 sacks Rochester Rose potatoes.
J. Holliday	Kluahne	June 4th, 1906	1 bag Ladoga wheat.
			1 „ oats.
			1 „ Western Rye grass.
			1 „ Hungarian.
			1 „ Timothy.
			1 „ Brome.

Copies of reports as to success met with seeds from the Experimental Farm, Ottawa, distributed by the R.N.W.M.P., in the Whitehorse district:—

KLUAHNE, Y.T., October 6, 1906.

MAJOR A. E. SNYDER,
Commanding R.N.W.M.P.,
Whitehorse, Y.T.

SIR,—In connection with the different seeds you so kindly forwarded to me in order to see whether the same could be grown and matured in my locality I beg to report that I was only sorry that they reached me too late to sow and expect them to mature. I shall retain them, or else get new seed, and next season if I am in the country it shall be my pleasure to give them a fair trial.

I have the honour to be, sir,
Your obedient servant,
(Sgd.) PHIL. HOLLIDAY,
Mining Recorder.

WHITEHORSE, Y.T., October 6, 1906.

Received of Major Snyder some field seed. They grew all right in some gardening which I did this summer.

(Sgd.) H. J. BIGGAR.

WHITEHORSE, October 10, 1906.

This is to certify that the grass seed known as the Western Rye received from Major Snyder as an experiment has given the greatest of satisfaction, and I do not wish for any better.

(Sgd.) MRS. H. GILCHEN.

WHITEHORSE, October 10, 1906.

This is to certify that the seed I received from Major Snyder came up all right but did not mature. The potatoes were small but of good flavour.

(Sgd.) MRS. W. G. WATSON.

WHITEHORSE, October 11, 1906.

MAJOR A. E. SNYDER, R.N.W.M.P.,
Whitehorse, Y.T.

DEAR SIR,—The grass seed sent out from the government experimental station at Ottawa, which you kindly furnished me early last summer produced a splendid growth. It appears to be a sufficiently hard variety for this climate.

Very respectfully,
(Sgd.) HARRY CHAPMAN.

WHITEHORSE, Y.T., October 13, 1906.

To the Officer Commanding
R.N.W.M.P., 'H' Division,
Whitehorse, Y.T.

SIR,—I have the honour to submit the following report on seed potatoes received from the experimental farm. I received from the Q.M. store two sacks of seed potatoes called the 'Rochester Rose,' which were planted by myself in good soil and under the best conditions. These potatoes were given every care to promote their growth and did very well until the exceedingly early frosts of this season destroyed the stalk growth and plants beating them to the ground and thus preventing the plants from attaining maturity. This variety appears to be a good hardy type of potato, but somewhat later than other varieties in attaining a strong stalk growth, thus being late in maturing. This is therefore owing to the extreme shortness of the Yukon season very much unsuited for growth in this territory as the early frost does not give the plants and necessary length of time to mature.

I have the honour to be, sir,
Your obedient servant,
(Sgd.) E. HOLMDEN.

Report of J. E. Shermer, Ten-mile point.

Rochester Rose potatoes. Five pounds of seed sown. Crop 60 lbs. of potatoes.

Western rye grass. No results.

Brome grass. No results.

Oats. Five pounds seed sown. Grew three feet high, did not ripen, about 200 pounds hay obtained.

Barley, six rowed, 5 pounds sown, grew two feet high, did not ripen, made 150 pounds hay.

Wheat, Preston, five pounds sown, grew three feet high, made 150 pounds hay.

Some reports from the officers commanding are also here given.

ROYAL NORTH-WEST MOUNTED POLICE,
YUKON TERRITORY.
ASSISTANT COMMISSIONER'S OFFICE,
DAWSON, Y.T., November 22, 1906.

SIR,—In accordance with the request of Dr. Saunders, Director of Experimental Farms, I directed the officers commanding at Dawson and Whitehorse to make a distribution of various seeds of grasses and grain sent in by the Department of Agriculture for experimental growing in the Yukon Territory. Notices were given to the local papers apprising the public of the fact that we had these seeds for distribution and any one applying was given samples on condition that he or she would furnish a report upon the results. These have just been received and I have the honour to forward herewith, for the information of the Department of Agriculture, copies of reports received from those who were supplied with seed.

I have the honour to be, sir,
Your obedient servant,
Z. T. WOOD,
Assistant Commissioner.

The Comptroller,
R.N.W.M. Police,
Ottawa, Ont.

DAWSON, November 19, 1906.

TO THE ASSISTANT COMMISSIONER,
R.N.W.M. Police.
Dawson, Y.T.

SIR,—I have the honour to make the following report on the seeds furnished by the Department of Agriculture, Ottawa, for experimental purposes in the Yukon Territory.

The seeds received were as follows:—

Stanley wheat, Preston wheat, Bishop wheat—a small quantity. Improved Ligowo oats, Welcome oats. Mensury barley, Odessa barley. Vick's Extra Early potatoes, Early Rose potatoes, Rochester Rose potatoes, Vermont Gold Coin potatoes. Timothy grass, Western Rye grass, Hungarian grass, Brome grass.

Of these all the potatoes, wheat, and grass seeds were issued, a quantity of both oats and barley still remain on hand. Every application, whether by letter or in person, was filled. There was a number of people who applied for garden and vegetable seeds, but these could not be filled.

While a number of people were supplied with seeds only nineteen reports of results were returned, copies of which are attached. There was considerable dissatisfaction expressed over the condition of the potato seed as they had all sprouted, sprouts eight to ten inches long being common. This unfortunately could not be avoided as the seeds had to be kept through the winter and the only available place where they could be kept without freezing was the Q.M. store, where the temperature was naturally too high.

Taking into consideration the condition of the seed, the potatoes were a distinct success and did very well, more especially the 'Vermont Gold Coin.' Of this variety A. Blaker, of Dawson, reports he grew potatoes one pound in weight; G. A. Hatch, of Dawson, mentions potatoes of one and one-half pounds of the 'Early Rose.' A. Blaker reports that from one pound 14 ounces of seed he had a yield of 64 pounds of ripe potatoes.

The wheat seems to grow well, but only in three cases did it ripen, the season seems too short. Menard and Grenier, of Pelly River, report both samples of wheat to have grown four feet high and to have ripened, while John King, of Flat Creek, sixty miles from Dawson, reports that they headed in fifty days, grew tall and rank but did not ripen.

The barley, more especially the 'Mensury,' seems to have done very well. Thos. McCabe, of Minto, who says he has grown much barley in Lambton county, Ont., reports this barley to have the largest head he ever grew. From the different reports barley would undoubtedly be a success in this country, the only report of a failure coming from R. B. Devlin.

Of the oats, Mr. Swinehart, of Selkirk, reports the 'Welcome' variety a complete failure. R. B. Devlin reports both varieties as not doing well, all the other reports are favourable. Menard and Grenier, of Pelly, report both varieties to have grown four feet high and to have ripened; John King, of Flat creek, reports both varieties to have headed in forty-five days, grown four feet high, filled out very well, but did not quite ripen. Thos. McCabe reports both to have done well and to have ripened. The different grasses have all grown very well, no failure being reported, except from Thos. McCabe, whose seed failed to grow owing to the extremely dry season at Minto.

I have the honour to be, sir,
Your obedient servant,
T. A. WROUGHTON, *Inspector.*
Commanding 'B' Division.

YUKON TERRITORY.

SEEDS supplied by the Department of Agriculture, Ottawa, 1906.

REPORT OF A. BLAKER OF DAWSON, Y.T., 1906.

Name of Seed.	Date of Planting.	Nature of Soil.	Remarks on growth, present condition and suitability.
Odessa Barley	May 15....	Light clay........	Came up well and headed out early in July, but fell down; ripened fair; cut Aug. 20. Nice looking grain, plumper than the seed. Have not threshed out, but the yield will be only fair.
Mensury Barley	" 22.	"	Same as above, but about 10 days later.
Preston Wheat	" 15....	"	Made a good stand and headed out well, but did not ripen.
Potatoes, Vermont Gold Coin.	" 27....	Light loamy clay....	This seed was badly sprouted; had sprouts 6 and 8 in. long. Kept in cool place until planting, but seed was in a bad condition then; planted 9 hills, yield45 lb. from 1 lb. 12 oz. seed. Lots of tubers weighed 1 lb. each. Cook dry and of fine flavour. Dug Sept. 15.
Potatoes, Early Rose....	" 27....	"	1 lb. 14 oz. seed; planted 21 hills, yield 64 lb. Was ripe a week before frost, otherwise as above. Dug Sept. 15.
Potatoes, Rochester Rose.	" 15...	"	1 lb. 8 oz. seed, in bad condition; planted 18 hills, yield 44½ lb. Fairly well ripened. Dug Sept. 15.
Potatoes, Vick's Extra Early..........	" 27....	"	1 lb, 12 oz. seed, in very bad condition; planted 12 hills, yield 26½ lb. No good. Poor eating.

REPORT OF MENARD AND GRENIER OF PELLY, Y.T., 1906.

Hungarian Grass........	May 15....	Black sand	Grew from 1 to 6 inches.
Odessa Barley	" 5....	"	Grew 3 ft. and ripened.
Mensury Barley	" 6....	"	" "
Ligowo Oats.....	" 6....	"	Grew 4 ft. and ripened.
Welcome Oats..........	" 6....	"	" "
Preston Wheat	.. ..	....	Spoiled in shipping.
Stanley Wheat..........	May 6 ...	Black sand	Grew 4 ft. and ripened.
Bishop Wheat	" 6 ...	"	" "
Rochester Rose Potatoes.	....	....	Spoiled seed.
Vermont Gold Coin Potatoes.	May 20....	Black sand	Matured in fine shape.
Vicks Extra Early Potatoes and Early Rose...	....	....	Spoiled seed.

The season has been so unusually dry that the crops have suffered for that reason in every respect.

YUKON TERRITORY.

SEEDS supplied by the Department of Agriculture, Ottawa, 1906.

REPORT OF THOS. McCABE OF MINTO, Y. T., 1906.

Name of Seed.	Date of Planting.	Nature of Soil.	Remarks on growth, present condition and suitability.
Preston Wheat	May 2	Sandy loam	Slow coming up, very dry season. Worst in 6 years; both kinds ripened and were a fair sample. Cut Aug. 15.
Stanley Wheat	" 2	" "	
Odessa Barley	" 2	" "	Slow in coming up; ripened and cut Aug. 15.
Mensury Barley	" 2	" "	Slow in coming up, but was a fair sample. Had the largest head of any barley I ever grew. I have grown much barley in Lambton County, Ont.
Welcome Oats	April 20		Both kinds came up early and did well for the dry season, ripened and was a fair sample. Cut Aug. 4th.
Ligowo Oats			
All grass Seeds	May 2		Did not grow. Season too dry.

REPORT OF G. A. HATCH OF DAWSON, Y. T., 1906.

Name of Seed.	Date of Planting.	Nature of Soil.	Remarks on growth, present condition and suitability.
Vermont Gold Coin Potatoes	May 7	Sandy	Gathered Sept. 12. 104 lbs. I think they will be a good potato for this climate.
Early Rose Potatoes	" 7	"	Gathered Sept. 12, 62 lbs.
Vick's Extra Early Potatoes	" 7	"	" " 12, 35 lbs.
Rochester Rose Potatoes	" 7	"	" " 12, 91 lbs.
Stanley & Preston Wheat	" 10	"	Fully headed and in full bloom Aug. 6, 38 inches high and the grains well formed. Cut Sept. 5, mostly ripened; would have ripened if left standing a few days longer.
Mensury Barley	" 10	"	Fully ripened 3 weeks ahead of the wheat.
Odessa Barley			

The oats also did well.

I had all the grass seeds which made a good start standing from 2 to 5 inches high on Sept. 20.

The potatoes were all planted and gathered on the same dates. The ground was well manured. In the Vermont Gold Coin yield there were 8 lbs. small potatoes, the rest running from the size of a hen's egg to 1½ lbs. each. The other varieties had more small ones. I intend to plant all I get from the 4 varieties next spring to give them a second trial.

YUKON TERRITORY.

SEEDS supplied by the Department of Agriculture, Ottawa, 1906.

REPORT OF JOHN KING OF FLAT CREEK COUNTRY, 1906.

Name of Seed.	Date of Planting.	Nature of Soil.	Remarks on growth, present condition and suitability.
Wheat	June.....1	Sandy muck	Headed in 50 days and grew tall and rank but did not ripen.
Oats	" 1	" "	Headed in 45 days, grew nearly 4 ft. high, filled out very well but did not ripen on account of an unusually wet season.
Barley	" 1	" "	Headed in 45 days, grew 4 ft. high, filled out well and ripened. I think barley would be a success in this country.
Brome Grass	" 1	" "	Grew 22 inches high, very rank and heavy but only a few seeds appeared and these did not ripen.
Western Rye grass	" 1	" "	A very fine grass, grew thick and rank but no seeds formed.

I think that barley would be all right for this country as it did so well this year and could not have had a worse season. Oats would ripen nearly every year.

YUKON TERRITORY.

SEEDS supplied by the Department of Agriculture, Ottawa, 1906.

REPORT OF W. H. SWINEHART OF SELKIRK, Y. T., 1906.

Name of Seed.	Date of Planting.	Nature of Soil.	Remarks on growth, present condition and suitability.
Odessa Barley	May.... 4	Sandy loam	Season dry and growth slow but consider barley suitable for this climate. Cut Aug. 10.
Mensury	" 4	" "	" "
Stanley Wheat	" 4	" "	Conditions same as the barley, but don't consider it a success in this country. Cut Aug, 10.
Preston Wheat	" 4	" "	" "
Ligowo Oats	" 4	" "	Fine growth and consider them O.K. Cut Aug. 15.
Welcome "	" 4	" "	A complete failure, only a few stalks came to a head, they acted like winter wheat sown in spring. Cut nothing.
Brome Grass Western Rye grass Hungarian " Timothy "	May.... 5	" "	Did well and look fine at present, but will not be able to report as to suitability before next year.

Oat samples of above did not look good. I imagine grain was wet before threshing.

Barley samples did not look good and bright as they should.

YUKON TERRITORY.

SEEDS supplied by the Department of Agriculture, Ottawa, 1906.

REPORT OF R. B. DEVLIN OF BONANZA CREEK, 1906.

Name of Seed.	Date of Planting.	Nature of Soil.	Remarks on growth, present condition and suitability.
Stanley Wheat	May 22	Sandy loam.	Growth fairly good but did not ripen.
Preston "	" 22	"	A total failure.
Welcome Oats	" 22	"	Very short and sparse.
Ligowo "	" 22	"	Just the same.
Odessa Barley	" 22		Did not mature at all.
Mensury "	" 22		" " "

Had also sown 10 acres of oats (sold here for feed). From the northwest portion of the field had a *very, very* heavy crop, balance of field a fair crop, oats well matured, but cut it for oat hay. Grown on same soil as samples, only not planted till two weeks later.

Have sown Timothy on 10 acres, looks well at present, and experimenting with it for next year.

REPORT OF W. HORKAN OF DAWSON, Y.T., 1906.

Potatoes.			
Vick's Extra Early	May 18	Sandy loam	Growth satisfactory.
Rochester Rose	" 18	" "	" "
Early Rose	" 18	" "	" good, early, medium size.
Vermont Gold Coin	" 18	" "	" very good, medium size.
Grasses.			
Brome	" 20	" "	Excellent results.
Hungarian	May 20 to June 10	" "	" "
Western Rye	May 15 to June 15	" "	Very vigorous growth.
Timothy	May 15 to June 1	" "	Very satisfactory.

REPORT OF GEO. F. HENLEY OF WEST DAWSON, 1906.

Early Rose Potatoes	June 1st	Light sandy loam	Toward the middle of August some of the potatoes had grown to the size of a goose-egg, about three of such a size were dug from each hill and in addition perhaps six smaller potatoes varying in size from a pigeon's egg to that of a hen's egg. Light frosts about this time—Aug. 15—checked the growth. No manure of any kind was used unless moss be a manure. Virgin soil on the side hill about 150 ft. above the city flat was chosen. I am satisfied that properly manured soil would produce excellent potatoes.
Grass			I am sorry to have no report on the grass as it was destroyed by roaming cattle.

YUKON TERRITORY.

SEEDS supplied by the Department of Agriculture, Ottawa, 1906.

REPORT OF GEO. J. MILTON OF FIVE FINGER COAL CO., 1906.

Name of Seed.	Date of Planting.	Nature of Soil.	Remarks on growth, present condition and suitability.
Brome grass	June 1st	Black loam	Seeds were planted a little too late, could not get land ready earlier. Grass seeds did very well and look very fine at present being about 1 ft. high, horses broke down the fence and ate up some of the grass. Hope to be in better shape to handle seeds next year. I believe all kinds of hardy grain and grass will grow in this country. I have a nice patch of Timothy and Clover growing.
Western Rye grass			
Hungarian grass			

REPORT OF McLAUGHLIN & GILLIN OF STEWART RIVER, Y.T., 1906.

Stanley wheat	May 19.	Black loamy soil	Grew well but did not ripen.
Preston 〃			
Ligowo oats	〃 19	〃 〃	Planted too late to ripen.
Welcome 〃			
Mensury barley	〃 19	〃 〃	Headed well but did not ripen.
Odessa 〃			
			Had we planted the above seeds earlier, undoubtedly they would have matured as they were very thrifty and headed well.
Grass seeds			Can't tell until next year.

REPORT OF W. S. LAURENCE OF FORTY MILE, Y.T., 1906.

Welcome oats	May 18	Upland	Both kinds are quick growers, matured in 100 days, short heads and light straw.
Ligowo 〃			
Mensury barley	〃 18	〃	Headed well and ripened early.
Preston wheat	〃 18	〃	Slow growth and small heads.
Stanley 〃	〃 18	〃	〃 〃 〃
Potatoes, Vick's Extra Early and Rochester Rose	〃 18	Island sand	Good growth and well matured.

REPORT OF C. A. LAMPHERE OF GOLD RUN, Y.T., 1906.

Vick's Extra Early potatoes	May 17	Sandy loam	Vick's Extra Early were a success, one seed producing as many as ten large smooth white potatoes without a blemish of any kind. Rochester Rose did not do well.
Early Rose potatoes			
Rochester Rose potatoes			
Stanley wheat	〃 20	〃	All grains except the samples of wheat grew well, Mensury barley being the best. Both samples of oats produced a good healthy crop but did not mature on account of the early frost.
Bishop 〃			
Preston 〃			
Welcome oats			
Ligowo 〃			
Mensury barley			
Odessa 〃			

YUKON TERRITORY.

SEEDS supplied by the Department of Agriculture, Ottawa, 1906.

REPORT OF T. BELL OF STEWART RIVER, 1906.

Name of Seed.	Date of Planting.	Nature of Soil.	Remarks on growth, present condition and suitability.
Brome, Western Rye and Hungarian grasses.....	May 10..	Silt................	I think pretty fair for first year, grass about 2 feet high. I did not plant the potatoes as they were all frozen.

REPORT OF C. E. KINSEY OF UPPER DOMINION CREEK, 1906.

Oats..................	....	Muck................	Did very well considering the backwardness of the season, but doubt they would ever ripen on this end of the Creek.
Wheat and Barley ...	....	....	Not sown owing to the backwardness of the season.
Timothy grass..........	....	....	" " "

REPORT OF JESSE H. ROGERS OF DOMINION CREEK, 1906.

Timothy grass.........	June 1..	Sandy loam.........	All the seed came up and grew to about 3 inches, expect a good crop of hay next year.

REPORT OF MRS. FLEISHMAN OF DAWSON, Y.T., 1906.

Grasses—			
Western Rye..........	May 22...	Heavy loam	Very good crop.
Timothy..............	" 22...	"	Good crop. Both these seeds were a great success, I have tried seeds before but did not do as well as with these.

REPORT OF R. McCLUSKEY OF DAWSON, Y.T., 1906.

Potatoes—			
Vermont Gold Coin...	May 28...	Black schist........	Good crop, 1 stalk produced 4 potatoes weighing 7½ lb.
Vick's Extra Early . Rochester Rose..... Early Rose	" 28...	"	Average crop.
Barley.................	" 28...	"	Both samples a good crop, will grow in the country.
Oats....................	" 28...	"	A good crop from both samples.
Timothy grass..........	" 28...	"	Grew very well.

REPORT OF DAVID COLLINS OF GRAND FORKS, 1906.

Oats.................	May 20...	Heavy loam on hill-side...............	Very good oat, ripened.
Barley.................	" 20...	" " ..	Fully matured with good heavy grain.
Potatoes.............	" 20...	" " ..	Seed frozen when received.

TESTS OF THE VITALITY OF SEED GRAIN AND OTHER SEEDS.

The following report includes tests of grain and other seeds grown on the several experimental farms, as well as those bought with the object of growing them on the farms. The list also includes tests of the vitality of a number of specimens of grain grown in the several provinces of the Dominion from the samples distributed from the Central Experimental Farm. These tests have been made with the object of ascertaining what climatic conditions are most favourable for producing seed of high vitality and how far this desirable quality is likely to be influenced by variations in character of season. Formerly these tests included a number of doubtful samples which were believed by the parties sending them to have been injured in their vitality by exposure to unfavourable conditions. All such samples are now referred to the Seed Commissioner for report. The results reported on here are the average proportions of vitality shown by samples of grain grown in different parts of the several provinces of Canada under healthy and normal circumstances. In the following table showing the results by provinces, the total percentage of vitality is given, also the percentage of strong and weak growth.

RESULTS OF TESTS OF SEEDS FOR VITALITY, 1905–06.

Kind of Seed.	Number of Tests.	Highest Percentage.	Lowest Percentage.	Percentage of Strong Growth.	Percentage of Weak Growth.	Total Percentage of Vitality.
Wheat	552	100·0	9·0	79·5	4·7	84·2
Barley	357	100·0	36·0	82·3	8·9	91·3
Oats	400	100·0	35·0	90·7	3·8	94·6
Rye	12	95·0	60·0	72·0	5·2	77·3
Peas	201	100·0	46·0	....	....	87·0
Corn	14	100·0	66·0	....	....	93·2
Beans	6	100·0	48·0	....	....	89·3
Clover	13	94·0	10·0	....	....	74·5
Grass	3	95·0	40·0	....	....	66·0
Flax	22	96·0	52·0	....	....	73·0
Carrots	5	27·0	16·0	....	....	21·6
Tares	1	86·0	86·0	....	....	86·0
Turnips	1	100·0	100·0	....	....	100·0
Miscellaneous seed	47	84·0	2·0	....	....	32·5

Total number of samples tested, 1,634. Highest percentage of vitality observed, 100; lowest, 2.

TABLE SHOWING RESULTS OF GRAIN TESTS FOR EACH PROVINCE.

Kind of Seed.	Number of Tests.	Highest Per-centage.	Lowest Per-centage.	Per-centage of Strong Growth.	Per-centage of Weak Growth.	Total percentage of Vitality.
ONTARIO.						
Wheat	242	100·0	9·0	69·3	6·8	76·1
Barley	122	100·0	36·0	71·1	14·5	85·7
Oats	115	100·0	60·0	88·5	4·4	92·9
QUEBEC.						
Wheat	35	100·0	63·0	91·5	2·1	93·7
Barley	33	100·0	86·0	90·0	6·3	96·4
Oats	36	100·0	61·0	89·6	3·6	93·3
MANITOBA.						
Wheat	69	100·0	79·0	90·4	2·8	93·3
Barley	46	100·0	87·0	84·2	9·5	93·8
Oats	61	100·0	83·0	93·4	2·9	96·3
ALBERTA.						
Wheat	10	100·0	65·0	83·3	4·3	87·6
Barley	6	97·0	85·0	85·5	7·8	93·3
Oats	8	93·0	35·0	76·0	6·1	82·1
SASKATCHEWAN.						
Wheat	71	100·0	67·0	86·8	3·3	90·1
Barley	54	99·0	41·0	86·5	4·3	90·8
Oats	62	100·0	73·0	89·4	3·8	93·2
NOVA SCOTIA.						
Wheat	44	100·0	76·0	89·5	2·7	92·2
Barley	39	100·0	74·0	89·7	5·5	95·3
Oats	44	100·0	92·0	95·0	2·6	97·7
NEW BRUNSWICK.						
Wheat	19	99·0	51·0	88·7	2·8	91·5
Barley	13	99·0	78·0	86·7	6·3	93·0
Oats	15	100·0	86·0	90·7	4·1	94·8
PRINCE EDWARD ISLAND.						
Wheat	15	99·0	67·0	89·0	2·7	91·7
Barley	6	100·0	93·0	92·3	4·8	97·1
Oats	12	100·0	90·0	92·7	3·7	96·5
BRITISH COLUMBIA.						
Wheat	47	100·0	58·0	78·8	4·5	83·3
Barley	38	100·0	77·0	92·1	4·3	96·5
Oats	47	100·0	85·0	93·0	4·5	97·5

Signed, WILLIAM T. ELLIS.

BULLETINS ISSUED DURING 1906.

Three bulletins were issued this year, No. 53 on the 'Results Obtained in 1905 from Trial Plots of Grain, Fodder Corn, Field Roots and Potatoes.' This bulletin was prepared jointly by Dr. C. E. Saunders, Cerealist, and the Director.

In this bulletin there are given the results of experiments which were conducted at all the experimental farms during the season of 1905 with spring wheat, oats, barley, pease, Indian corn, turnips, mangels, carrots, sugar beets and potatoes. The relative earliness and productiveness of the varieties are also recorded, with the average crops obtained during the past five years, the several varieties being placed in the lists in the order of their productiveness for that period. A considerable number of cross-bred varieties produced on the experimental farms are included in these tests.

No. 54, on the 'Breeding, Feeding and General Management of Poultry.' Part 1 of this bulletin was written by Mr. A. G. Gilbert, Poultry Manager, in which is discussed the principles underlying profitable poultry raising, description of breeds, rations and manner of feeding them, the moulting of fowls and methods of shortening this period of non-production. Short chapters are also written by Mr. Gilbert on turkeys, ducks, and geese.

Part 2 was prepared by Mr. Victor Fortier, Assistant Poultry Manager, in which he treats of incubation, natural and artificial, poultry raising, the fleshing of chickens and the fattening of fowls, poultry buildings and runs and the general treatment of poultry, including diseases, injuries, &c.

Bulletin No. 55 treats of the crops obtained in 1906 from the annual trial plots on the several experimental farms. This is the twelfth of that series of bulletins and was prepared jointly by Dr. C. E Saunders, Cerealist and the Director. In this bulletin the crops of each year are given, also the average of the past five years, showing the relative productiveness of the many different sorts in the several provinces of the Dominion in which the experimental farms are located. For example, the average crop produced in 1906 by the sixteen varieties of spring wheat under trial at Ottawa was 32 bushels 38 lbs. per acre. At Nappan, N.S., it was 29 bushels 27 lbs. At Brandon, Man., 35 bushels 52 lbs.; and at Indian Head, Saskatchewan, 42 bushels 11 lbs.

Of oats there were 37 varieties under trial, these gave at Ottawa an average crop of 60 bushels 11 lbs. per acre; at Nappan, N.S., 47 bush. 18 lbs.; Brandon, 97 bush. 31 lbs.; Indian Head, 105 bush. 25 lbs., and at Agassiz, 60 bush. 7 lbs. per acre. The results obtained from these uniform trial plots show that there are marked differences in the relative productiveness of varieties even when grown side by side under similar conditions. Such facts point to the importance of farmers choosing for seed those sorts which give the heaviest crops.

JOURNEYS THROUGH THE WEST.

It has been my privilege to travel through the past year over several important districts in Western Canada, concerning which a few notes are submitted. These notes were taken mainly along the line of railway and in such cases only those parts of the country in sight of the railway are referred to.

CALGARY TO EDMONTON, SEPTEMBER 5, 1906.

From Calgary to Beddington, 11 miles, much of the land is used for ranching purposes and very little in the way of grain crops is seen, only a few small fields of oats or wheat. Beddington to Airdrie, 9 miles, land still devoted mostly to ranching, fields of grain seen in increased number.

Airdrie to Crossfield, 10 miles (31 from Calgary). The land for about the first 27 miles from Calgary is quite bare of trees or shrubs, but about 7 miles beyond

Airdrie the first shrubs appear, mostly small bunches of willows. A few fields of oats, barley and brome grass were seen in this district. Crossfield is growing rapidly. The land seems to be of good quality in this vicinity. About Crossfield and north the shrubby growth of willows is more plentiful and covers some of the fields in the neighbourhood quite thickly.

Crossfield to Carstairs, 10 miles. Fields of oats plentiful in this area, also some fields of winter wheat. In some parts quantities of hay were cut and stacked, the growth of grasses was quite heavy here. The town of Carstairs is growing very fast. The first poplar trees seen in this district were north of Carstairs. Willows were abundant there.

Carstairs to Didsbury, 8 miles. Saw crops of spring wheat nearly ripe and numerous fields of oats, many of them in stook; also, several large fields of winter wheat well up and quite green. Didsbury is a good-sized town and growing fast. Saw some large fields of wheat north of Didsbury, also some large areas in summer fallow.

Didsbury to Olds. Country well settled, saw many large fields of good spring grain, some cut, some still standing. Some fields of winter wheat; a fine stretch of country with many good farms. Haying was in progress all along the route. Country partly covered with trees and scrubby undergrowth, especially beyond Olds.

From Olds to Innisfail, 19 miles, the district is well settled. Many fields of spring wheat and oats were seen and much of the grain was ripe. Innisfail is a good dairy centre and a thriving town. One of the largest creameries in the Northwest is well sustained here.

From Innisfail to Penhold, 5 miles, is a very pretty country with an extended view, some fine farm lands lying on a nice slope near Innisfail with a pretty lake in the background.

From Penhold to Red Deer, 10 miles, some of the land along the railway is good; other sections are rather low and some apparently wet. This district yields large crops of hay. Red Deer is a thriving place and quite a business centre, with some very good country around it.

From Red Deer to Blackfalds, 12 miles, there is much good hay land most of which is probably too low for successful grain growing. There are, however, many fields of grain on the higher lands. The land in this vicinity varies much in quality, some of it being very good while other sections are light and gravelly. Some good winter wheat has been grown in this locality.

Blackfalds to Lacombe, 7 miles. Land generally good and well settled, the higher lands are devoted to grain growing while the lower portions produce excellent hay.

A NEW EXPERIMENTAL FARM AT LACOMBE.

Lacombe is a busy town which has good railway facilities. Besides being on the Calgary and Edmonton line, it has a branch line extending 51 miles east to Stettler. On examining this district a very good and suitable site was found for a branch experimental farm for Northern Alberta. This is the southeast quarter of section 24—40—27. This quarter section adjoins the town; the railway runs across the lower corner of it cutting off from 15 to 20 acres. The Hudson Bay trail to Edmonton, one of the principal roads for travel in this part of the country, also passes through this land. This leaves about 150 acres available for cultivation, a large proportion of which has already been brought under crop. The soil is a dark loam, rich and fertile, partly clay and partly sand, much of it with a clay subsoil. This quarter-section lies on a beautiful slope facing the railway, and nearly all of it can be seen from the passing trains. It is also within easy walking distance from the station, about a mile. This farm has water of excellent quality. This land has been secured and the establishment of an experimental farm for Northern Alberta on this site is now in progress.

Lacombe to Morningside, 6 miles. Beyond Lacombe the country continues much the same to Morningside. Many fields of grain were seen, although the larger part of the land was in hay. A fine open country with good views of the distant fields from the train. From Morningside to Ponoka, 7 miles farther, much the same scenery prevails.

From Ponoka to Hobbema, 12 miles, much of the land is low, a valuable hay-making district. Not many improved farms seen from the railway. There are good lumber mills at Ponoka. Spruce timber grows here to a fair size, and in considerable quantities. There is a large Indian reserve along this district on which there is practically no land broken on the railway front, but stacks of hay were put up at several points.

Hobbema to Wetaskiwin, 10 miles. As soon as the Indian reserve is past the country becomes well settled and fields of grain again appear on the landscape. Immediately about Wetaskiwin the land is rather flat, but the soil is very good over most of this district and considerable quantities of grain are grown here on both sides of the railway. There is a branch railway running southeast from Wetaskiwin to Hardisty, a distance of 95 miles.

From Wetaskiwin to Millet, 11 miles, considerable quantities of grain were seen, chiefly in stook. Land rather flat and some of it low on each side of the railway, about Leduc there are several small lakes or ponds on the east side of the town, surrounded by good natural hay-lands.

Millet to Leduc, 11 miles. A large number of grain fields about Leduc, one elevator there. From Leduc to Otoskwan, 10 miles, many more grain fields were seen; as yet, however, only a small proportion of the available land is under cultivation.

Otoskwan to Strathcona, 9 miles. Some very good land in this district and considerable quantities of grain are grown. Both Strathcona and Edmonton, on the opposite side of the Saskatchewan river, are favourably located with fertile lands all about them. As a rule the lands about the margin of the river are somewhat light in character, a sandy loam of a dark colour, while heavier clayey soils prevail a short distance from the river. Edmonton has grown wonderfully and is expanding in every direction.

EDMONTON TO HUMBOLT.

September 1, 1906.—During this journey about 400 miles of the main line of the Canadian Northern Railway were covered and a large area of fine country seen. Many settlers are moving in all along the line and every year large additional tracts of land are brought under cultivation. As a rule the remarks on what was seen in passing through apply only to the land in view from the railway. More extended information was occasionally had by stopping over and taking drives through the country and calling on some of the settlers. This was done whenever time would permit.

Edmonton to Oliver, 8 miles. Passed some fine fields of oats mostly cut, and some of wheat all cut. Oliver to Fort Saskatchewan, 9 miles. There is quite a large area under crop in this district and a quantity of new land is being brought under the plough. The cutting of crops was proceeding rapidly. The town of Fort Saskatchewan is growing very fast.

Fort Saskatchewan to Scotford, 7 miles. Saw some fair crops of wheat. There is not yet much land under cultivation in this locality and the treatment of the soil by the new-comers is not always very thorough. The fields of grain seen were more than half cut, straw rather short crop, mostly medium, in some places good.

Scotford to Bruderheim, 6 miles. Saw a good deal of crop in this district, the wheat was all cut and most of the oats. Considerable quantities of spruce suitable for timber were seen in the woods through which we passed. Bruderheim to Lamont, 7 miles. A good country, with good land and where fields were under cultivation the crops were good.

Lamont to Chipman, 8 miles. Saw many fields of grain; the country is here more open and prairie-like, not without brush, but it is small and scattered. The soil at Chipman seemed rather shallow, a greyish clay with more or less black soil intermixed, with rather a hard clay subsoil. A mile or two out from the town the soil changed again to a deep friable black loam and fields of grain again appeared.

Chipman to Mundare, 14 miles. The grain seen here was rather short in straw, but would probably give a fair crop. Galician houses, one story high, neatly thatched and more or less ornamented were frequently seen. In this part of the country there are many Galicians settled, within a radius of 50 or 60 miles there are said to be from twelve to fourteen thousand of them. They seem to till their land well and to average good crops. Mundare has made but very little growth. The almost exclusive foreign element in the population does not seem favourable to the rapid growth of a town.

Mundare to Vegreville, 14 miles. A stop was made at this thriving town which was about six months old and had a population of four to five hundred. A pleasant and interesting drive was taken through this part of the country covering about 60 miles in all, visiting Beaver Lake and many parts of the numerous Galician settlements. The progress made in the cultivation of their land seemed in many instances to be slow, due doubtless partly to the fact that at first many of the settlers are obliged to work out for other farmers or on the lines of railway to earn money with which to buy implements, stock, &c., for their farms, also food supplies for their families. Several homes were visited where the inmates had been three or four years on their farms. These had accumulated some stock and had good-sized fields of grain, and seemed contented. There is no doubt that after a time they will make good progress as they are industrious and frugal.

From Vegreville to Lloydminster, about 100 miles, the line was passed over in the night and the following day spent in driving about among the Barr colonists. These people who came over from England in a body some three or four years ago, have made good progress. Most of them have completed their homestead duties and have taken out the patents for their land and many of them now have with the increase in the value of their homesteads, property varying in value from $1,500 to $2,000 or more. They seem to have adapted themselves to their conditions, are living in a fair degree of comfort and are moving along towards comparative independence. A drive of 20 miles was taken through the district from Lloydminster to Lashburn and many of the settlers called on. The land in this district seems very good and the crops realized had been satisfactory.

Lashburn to Maidstone, 14 miles. Passed through much the same sort of country as in the drive from Lloydminster. While most of the land seen was very good, some fields were passed where the soil was lighter, and occasionally sandy or gravelly soil was noticed. From Maidstone to Paynton, 16 miles, the soil averages much lighter, much of it being sandy; the land however, improves in quality near Paynton.

Paynton to Delmas, 15 miles. Land variable in this district, part of it stony, some sandy or gravelly and some portions of better soil. Delmas to North Battleford. Leaving Delmas the land is at first of better quality then stony and gravelly alternating with better land. This is a fine open district; as the Saskatchewan river is reached, the grade takes the train gradually down and the crossing is made over a high bridge.

North Battleford was growing very rapidly and new houses were going up in every direction. The land along the bank of the Saskatchewan is for the most part a sandy loam and is variable in character. Very little grain was seen on either side of North Battleford. From that town to Denholm, 17 miles, several fields of grain were seen. The soil was quite variable, some of it good, but the larger part seen from the railway was stony and gravelly.

From Denholm to Ruddell, 9 miles, the country is fine and open and most of the land very good when one gets away from the river. At Ruddell there was some crop on a hillside which looked very promising.

Ruddell to Fielding, 17 miles. Much of the soil in this locality seems to be a rather light sandy loam. The fields of wheat seen did not promise a heavy crop and the oats were short in the straw. North of Fielding there were large crops of excellent grain. There the land was lower and probably had a heavier soil. The town of Fielding is growing fast and there is a fine stretch of country about it extending for some miles.

Fielding to Radisson, 9 miles. The town of Radisson has also made excellent progress. The land east of the town seems very good and a large acreage there is under crop. The land on the west side is rather low and wet. This district is a promising one, most of the land is very good and there is a large acreage of land newly broken.

Radisson to Langham, 15 miles. The land through this district is somewhat variable, much of it is good, but some sections are lighter and more or less sandy. Land very similar from Langham to Warman Junction, where the main line crosses that from Regina to Prince Albert. About the junction the soil is comparatively light and the crops of wheat were only medium, the stooks comparatively few and the straw shorter than the average.

Warman to Clarkboro and Aberdeen, 11 miles. Before reaching Clarkboro the Saskatchewan river is crossed on a fine iron bridge. After this the railway runs along a stony ridge where stone lies on the surface on either side in great abundance. After a few miles the land becomes free from stone but is light in quality. Passed a Doukhobor village in the distance between Clarkboro and Aberdeen. There is here a large piece of open prairie with a few occasional small clumps of willow. About Aberdeen many stacks of grain were seen. Much of the soil appears to be of good quality.

Aberdeen to Vonda, 8 miles. Land variable, some light, other sections fairly heavy; not much crop in sight, most of the land unimproved. Depth of loam variable and mostly of a dull, dark-reddish colour, sometimes of a light sandy or light coloured clayey character, and in some places gravelly. Within several miles of Vonda the character of the soil changes to a good black loam and wheat fields again appear. One very large field and several smaller ones were seen near Vonda, the crop appeared to be good. Vonda is a thriving town which has been all built within about a year. There is a Galician settlement north of this town.

From Vonda to Howell, 9 miles, is an open prairie country where a few fields of wheat were seen which looked rather light, probably due to imperfect preparation of the soil. Howell to Dana, 9 miles. Howell is a new town about three months old and growing fast. It has a good farming country about it. Between Howell and Dana there is some stony land, but as Dana is approached it becomes less stony and a considerable quantity of land has been broken. Before reaching Dana many bluffs of poplar and willow were seen and the country became more rolling. Passed several large lakes, two or three miles distant from the railway.

Dana to Bruno, 8 miles. Land open and prairie-like with more or less stones scattered over its surface, these are also quite numerous occasionally along ridges. Saw a few fields of wheat in this locality which promised a good return.

Bruno to Carmel, 8 miles. Soil light, with a gravelly subsoil, looked very dry. The surface loam was for the most part a thin layer with a pale grey subsoil of a sandy or clayey character.

Carmel to Humbolt, 8 miles. Along this part of the line there were a few pieces of breaking, but no crop worth mentioning until near Humbolt, where settlement is more dense and a number of wheat stacks were seen. The town of Humbolt is very badly situated on low land amongst several sloughs or ponds filled with stagnant water. Pieces of land near the town which lie above the sloughs have produced some good wheat. On land north of the town three or four miles where it rises gradually some very fine fields of wheat were seen in stook, which, judging from the size and number of the stooks and the character of the stubble, would give a heavy yield. In driving over the country an occasional field was met with which was quite stony. Most of the land, however, seems to be free from stone and of very good quality.

North of Humbolt for 25 miles or more to Dead Moose Lake the land is said to be very good and all homesteads taken, but north of that the country is rough and broken, mostly covered with wood and an abundance of sloughs for 20 miles or more, beyond which to Melfort, a distance of about 30 miles, the land is again good and the greater part of the homesteads taken. South of Humbolt the land is said to be nearly all good and most of the homesteads taken, and for 40 miles east to the Quill lakes the land is reported as very good and the country well settled.

REGINA TO PRINCE ALBERT, SEPTEMBER 13.

From Regina to Condie, 9 miles, was almost one continuous wheat field all now cut and in stook, the crop here seemed to be very heavy. Condie is a small place, but has three elevators. From Condie to Lumsden, 11 miles, most of the district (the Qu'Appelle valley) furnishes excellent hay and pasture. Lumsden is growing rapidly and for several miles there are considerable tracts of land in the valley under cultivation. Going up out of the valley, the great level country is reached and about Disley, 8 miles farther on, there are a few large fields of wheat in sight.

From Disley to Bethune, 9 miles, the soil is light, but there were a few grain fields in sight from the railway near Bethune. From Bethune to Findlater, 10 miles, most of the land is thickly covered with small stones mixed with occasional larger ones and this condition extends to Findlater. Practically there is no cultivation in this district on either side of the railway. From Findlater to Chamberlain, 9 miles, similar conditions continue although the land is somewhat less stony, and from Chamberlain to Aylesbury, 8 miles farther, the land continues very stony and no attempts at cultivation were seen between these points.

Aylesbury to Craik, 9 miles. At Aylesbury, where there is no town—only a siding—two elevators have been built. The land continues stony here along the track, but some two or three miles distant on either side the land becomes good and a considerable quantity of wheat is grown. From Craik to Girvin, 9 miles, there are large areas of wheat which, judging from the character of the stubble must have yielded well. Craik is growing rapidly, but at Girvin, about which there is not much land under cultivation, not so much progress is being made.

Girvin to Davidson, 6 miles. Davidson is surrounded by good land, and many large fields of grain were in sight. A large town has sprung up here where three or four years ago there was nothing but bare prairie.

Davidson to Bladsworth, 12 miles. Much grain seen at a distance from the railway, especially near Davidson. As Bladsworth is approached much of the land is of poorer quality and there is very little of it under cultivation. From Bladsworth to Kenaston, 11 miles, there is also very little crop. Much of the soil looks light with more or less alkali. Bladsworth and Kenaston are both small places and seem to be making slow growth.

Kenaston to Hanley, 14 miles. Leaving Kenaston the land for some distance is inferior in character but as Hanley is approached the land becomes good and there was a large amount of crop seen. Hanley is a good sized town and is growing rapidly.

From Hanley to Dundurn, 11 miles, the land is of excellent quality and there was a very large area of wheat in sight, either wheat in stook or summer fallowed land being visible as far as the eye could reach on either side. The quantity of wheat produced in this district is very large.

Dundurn to Saskatoon, 14 miles. After travelling a few miles from Dundurn there was no grain seen worth speaking of until near Saskatoon where many large fields were seen both north and south of that place. Much of the land on the east side of the Saskatchewan is light although there are some good farms. On the west side of the river the land is much better, most of it of very good quality with a dark clay loam of a considerable depth with a dark chocolate-coloured clay subsoil.

Saskatoon to Warman, 12 miles. Saskatoon has grown to be a large place and is extending its boundaries rapidly. For some miles out, many large fields of grain were seen, but towards Warman there is not much land broken. Warman is a young and growing town. Opportunity was afforded there of examining the land at several points; most of it was a light sandy loam not very deep with a subsoil varying in different parts from stiff clay to sandy clay and in some places a light coloured sand. There were a few stones on the surface and a good many in the subsoil.

Warman to Osler, 6 miles. About Osler the land is much lighter and some of it gravelly. From Osler to Hague, 10 miles, much of the soil is light and there was not much grain seen from the railway.

Hague to Rosthern, 12 miles. As Rosthern is approached most of the land becomes good, large quantities of wheat are in sight and the crops are fairly heavy. At Rosthern a large quantity of wheat is marketed.

Rosthern to Duck Lake, 11 miles. Beyond and about Rosthern on every side there were large quantities of wheat, most of it in stook and threshing progressing rapidly, country fairly level and well settled. Most of the land south of Duck Lake seems very good and grows excellent wheat. Nearer the lake the grass is good and affords excellent crops of hay.

Duck Lake to Roddick, 9 miles. From Duck Lake north, the country begins to be wooded and grain fields become much less plentiful. From Roddick to Macdowall, 9 miles, spruce is very abundant, associated in wet spots with tamarack, the higher points being covered with poplar.

Macdowall to Prince Albert, 20 miles. The grain crops all through this district are quite limited. Such wheat as is grown in this locality is used chiefly in a local mill belonging to the Hudson Bay Co. at Prince Albert. In some places the country is more open with a good deal of hay land and a considerable number of sloughs and small lakes with good farm land intervening. The soil all through the Prince Albert district up to the Saskatchewan seems to be rich and fertile and will bear good crops wherever the soil is high enough above the sloughs and ponds with which the country abounds, to admit of early cultivation. On the opposite side of the North Saskatchewan there is a margin of good land for a mile or two, then a swampy district thickly covered with tamarack and north of this there are many miles of sandhills covered with Jack Pine. Most of the larger trees have been cut for lumber, the smaller trees covering the ground quite thickly. In some places the pine was more or less replaced by poplar (*P. tremuloides*). North of this belt of Jack Pine there are hay-lands with sloughs which are said to extend for about 20 miles to Sturgeon Lake. Beyond this the country is said to be again fit for settlement.

There is a large lumber industry at Prince Albert. The Shell river and the Red River of the North both empty into the Saskatchewan above Prince Albert, and logs are brought down these streams to the lumber mills for 100 miles or more.

PRINCE ALBERT TO MELFORT.

A trip was taken of 56 miles over this northern section of the Canadian Northern Railway beginning August 6, 1906.

Prince Albert to Davis, 10 miles. In this district there is very little land under cultivation. There are considerable quantities of wood and a large number of small ponds and lakes. The land looks good but is much broken.

Davis to Birch Hills, 16 miles. There is not much settlement yet along this line, the country is thickly covered with bluffs of willow and poplar and there are many ponds, some of the shallower of which had dried up leaving a white alkaline deposit. Small trees cover a large part of the land, too large a part to make it attractive to the settler who is looking for wheat land, but for mixed farming and the raising of stock, this district offers many advantages.

Birch Hills to Kinistino, 20 miles. The country has much the same wooded character as that travelled over from Prince Albert here, but before reaching Kinistino the country becomes more open and better settled with larger areas under crop and much less affected by sloughs.

Kinistino to Melfort, 10 miles. The Carrot river is crossed soon after leaving Kinistino and the land here from some miles west of Kinistino to Melfort seems to be of very good quality. This part of the district is more open and is well settled and there is much more crop to be seen, especially wheat.

At Melfort a stop was made and a drive taken over the country which afforded opportunity for examining several farms. The soil for the most part was excellent—a rich sandy loam with plenty of humus in it and more or less mixed with clay. The soil was about 15 inches deep with a friable clay subsoil. The different farms examined were almost uniformly good as to soil and the whole district has an excellent reputation for productiveness.

VISITS TO THE BRANCH EXPERIMENTAL FARMS.

Visits were paid to the branch experimental farms in the west during August and September, and the farm for the maritime provinces was visited in October.

EXPERIMENTAL FARM, BRANDON, MAN.

In Manitoba the season was very favourable both for seeding and subsequent growth, germination was even and growth rapid and there was no injury from late spring frosts. There was a promise of very heavy crops when rust appeared and reduced the yield somewhat. Subsequently as the wheat was about maturing a few days of excessive heat with a south wind ripened it up rapidly and thus the expected average yield was further reduced. Harvest began about August 15; the weather was good and the grain secured in excellent condition. The harvest on the whole was fully a week earlier than usual.

The field crops of spring wheat varied from 28 to 44 bushels per acre, the experimental plots from 21 to 35 bushels. Oats varied from 70 to 116 bushels per acre; barley from 44 to 66 bushels, and pease from 38 to 58 bushels per acre.

Indian corn ranged in crop from 14 to 31 tons of green fodder as cut for the silo, this crop was good and well matured. Turnips yielded from 18 to 26 tons; mangels 24 to 38 tons, and potatoes from 256 to 495 bushels per acre. The crop of fruits of most sorts was below the average.

The general condition of the farm and stock, also that of the implements, tools, &c., was creditable to the superintendent.

EXPERIMENTAL FARM, INDIAN HEAD, SASK.

The season of 1906 was generally favourable to crops both in Saskatchewan and Alberta. Spring wheat, oats and barley all gave good returns. The spring opened early in April and continued favourable until seeding was completed. Abundant moisture caused rapid and satisfactory growth. In July hot weather checked excessive growth in straw, and a second hot period in August hastened ripening and brought on an early harvest.

The harvest weather was good and the grain was gathered promptly. Threshing started without delay on completion of the harvest and was finished early. A hail storm, the first ever experienced at Indian Head, occurred on July 24. This injured all the crops more or less, but the injury was not very severe. The fields of spring wheat varied in yield from 25 to 38 bushels per acre; the experimental plots gave from 35 to 48 bushels. Oats in field crop gave from 60 to 87 bushels; in plots the return was from 78 to 128 bushels per acre.

Barley in field crops returned from 50 to 58 bushels per acre and in experimental plots from 40 to 65 bushels. Pease also gave excellent returns, in field lots from 32 to 42 bushels per acre and in plots from 30 to 45 bushels.

Indian corn cut green for the silo gave from 12 to 16 tons per acre; turnips from 14 to 22 tons; mangels from 14 to 28 tons, and potatoes from 224 to 433 bushels per acre.

The farm throughout was in excellent condition, showing evidences of thoughtful care and attention on every hand.

EXPERIMENTAL FARM, AGASSIZ, B.C.

The past winter was a mild one, the lowest temperature during the season was on December 17, when the thermometer registered 15 degrees of frost. The summer on the whole was a good one for most farm crops. The spring opened early, clover was six inches high by the end of March; cold winds and frequent showers in April and May kept the crops from growing rapidly and frequent showers in June made it difficult to cure hay. During the dry and warm weather in July and August the grain made good progress and with favourable harvest weather was saved in good condition. The hay crop throughout the province was a good one and in most localities was well saved. The wheat crop in the interior of the province was very good, but very little wheat is grown in the coast climate. The oat crop throughout the province was above the average and was harvested in good condition. Not much barley is grown, but the yield has been very satisfactory. Field roots owing to the dry weather which prevailed during the greater part of July and the first half of August gave crops which were somewhat below the average. The yields of potatoes were good. The different varieties of oats grown have varied in yield from 43 to 73 bushels per acre; barley from 27 to 49 bushels, and pease from 26 to 50 bushels. Indian corn cut green for fodder has given from 11 to 24 tons; turnips from 11 to 23 tons; mangels from 11 to 27 tons, and the different varieties of potatoes tested have varied from 200 to 611 bushels per acre.

The cold damp weather of April and May was unfavourable for many varieties of fruit. The crop of apples was about an average one, in some orchards it was heavy. Pears and cherries were a light crop. There was a fairly heavy crop of plums of very fine quality and very free from rot.

The cattle and sheep have done well. There have been many visitors to the farm during the year who have expressed much appreciation of the work in progress.

EXPERIMENTAL FARM, NAPPAN.

The season was not a particularly good one at Nappan, a long wet period in the spring had the effect of making all spring sown crops later than usual. Hay on the whole was a better crop than the average.

The very wet spring was followed by unusually hot summer weather which hurried the grain rapidly to maturity, and the quality of the crop was not quite up to the average, the yield also for the same reason was somewhat lessened. Pastures during the early part of the season were good, but they suffered from the hot weather later on.

The different sorts of crops under trial gave results as follows: spring wheat from 26 to 34 bushels per acre; oats from 40 to 63 bushels; barley from 30 to 45 bushels, and pease from 18 to 35 bushels.

Indian corn cut green for the silo gave from 15 to 25 tons; turnips from 15 to 30 tons; mangels from 13 to 24 tons, and potatoes from 242 to 503 bushels per acre. Eighty-five acres of hay yielded 132 tons 1,745 lbs.

Successful experiments were conducted in the feeding of steers, also with swine. Interesting and useful tests were also made with many different sorts of fruits and vegetables.

NEW BRANCH EXPERIMENTAL FARMS.

Two new branch experimental farms have recently been established, one at Lethbridge to serve the purposes of Southern Alberta, the other at Lacombe for Northern Alberta. The experimental farm for Southern Alberta is situated about 2½ miles from the town of Lethbridge on the Lethbridge and Crowsnest section of the Canadian Pacific Railway. It consists of 400 acres of land, 100 acres of which can be irrigated. The other 300 acres lie too high to admit of this and will be devoted to experiments in dry farming. On the irrigated portion the effect of water in the raising of crops will be studied, the quantities which should be applied under certain conditions, the number of applications needed, &c. All such problems will be investigated and reported on and in this way information likely to be of the greatest value to those growing crops on irrigated land will be obtained. On the higher land which cannot be irrigated, the various problems connected with dry farming will be studied and experiments will be conducted along lines of general farming to find out what crops can be grown and what treatment of the land is best to reach success with a scanty rainfall. Many experiments under both these conditions will be carried on with fruits, vegetables, forest trees, &c.

The experimental farm chosen for Northern Alberta is a quarter-section of land adjoining the town of Lacombe and about a mile from the railway station. Lacombe is a busy town about 70 miles south of Edmonton and the centre of a good agricultural district on the line of the Canadian Pacific railway from Calgary to Edmonton. It has also a branch line running east to Stettler, 51 miles distant, a line which will probably soon be extended to Moosejaw. The farm site has a good soil representative of the district and lies in a commanding position overlooking the railway and the surrounding country.

Mr. W. H. Fairfield has been appointed Superintendent of the farm at Lethbridge, and Mr. G. H. Hutton, Superintendent of the farm at Lacombe. Both of these officers have had excellent training in the lines of work they will have the responsibility of conducting in this important western province.

CHANGES IN THE STAFF.

It is with regret that I have to record the loss to our service of two long tried and faithful officers, both of whom have left the experimental farms to engage in more remunerative work. Mr. S. A. Bedford, so long and favourably known as superintendent of the experimental farm for Manitoba, has resigned his position on the farm at Brandon to enter into business. Mr. Bedford was the first of the superintendents appointed on the western farms and has had charge of the experimental farm at Brandon from the outset. In his management he has been most successful. In his work he has been careful and accurate and his reports have been interesting and valuable. The suggestions and recommendations he has made from time to time have been followed with profit by many farmers in Manitoba. The experiments conducted have covered a wide range in agriculture, horticulture and arboriculture and have been of great value to the country. Mr. N. Wolverton, B.A., has been appointed as his successor. He has had considerable experience and success in farming in Manitoba. His report of the operations conducted at Brandon during the past year will be read with interest.

Mr. John Fixter joined the experimental farm staff as farm foreman at the Central Farm, Ottawa, during the first year of its existence and has filled the position ever since with much satisfaction. He was a capable and efficient officer, thoroughly reliable and painstaking in all the work which devolved on him. He resigned his position at Ottawa to accept a more remunerative one at the Macdonald College, at Ste. Anne de Bellevue, Que. Mr. D. D. Gray has been selected to fill the vacancy and is discharging the duties of the office satisfactorily.

CORRESPONDENCE.

The correspondence carried on between the farmers of Canada and the officers of the experimental farms has been very large.

CENTRAL EXPERIMENTAL FARM.

The following is a summary of the letters received and sent out at the Central Experimental Farm from April 1, 1906 to March 31, 1907:—

	Letters received.	Letters sent.
Director	63,727	21,080
Agriculturist	2,973	4,140
Horticulturist	1,652	1,627
Chemist	1,483	1,442
Entomologist and Botanist	3,294	2,872
Cerealist	368	276
Poultry Manager	5,098	3,175
Accountant	1,212	1,744
	79,807	36,356

Many of the letters received by the Director are applications for samples of grain or for the publications issued by the experimental farms, a considerable proportion of which are answered by mailing the material asked for, accompanied in some instances by circular letters. This will explain why the number of letters received by that officer so much exceeds the number sent out.

DISTRIBUTION OF REPORTS, BULLETINS AND CIRCULAR LETTERS.

Reports and bulletins mailed	250,089
Circular letters, including circulars relating to samples of seed grain	60,128
	310,217

Branch Experimental Farms.

The correspondence conducted by the superintendents of the branch experimental farms is also large, as is shown by the following figures:—

	Letters received.	Letters sent.
Experimental Farm, Nappan, N.S.	2,675	2,715
" Brandon, Man.	4,114	4,089
" Indian Head, Sask.	8,469	8,365
" Agassiz, B.C.	3,328	3,051
	18,586	18,220

Much additional information has also been sent out from the branch farms in printed circulars. By adding the correspondence conducted at the branch farms to that of the Central Farm, the total number of letters received is found to be 98,393, while those sent out number 54,576.

ACKNOWLEDGMENTS.

I beg to tender my thanks for special services rendered and donations sent me during the year, to the Director of the Arnold Arboretum, Jamaica Plains, Mass., for seeds of many sorts of rare trees and shrubs for trial as to their hardiness and value in different parts of the Dominion; to the United States Department of Agriculture, for many favours, including samples of cereals, seeds of fodder crops, &c., for test from foreign countries; to the Director of the Royal Gardens, Kew, England, and to many other correspondents for seeds of many sorts of trees, shrubs and plants; also to Prof. John Macoun and Mr. J. M. Macoun of the Geological and Natural History Survey of Canada, for seeds of rare Canadian plants.

To the officers of the Central Experimental and Branch Experimental Farms, my thanks are due for their earnest co-operation in carrying on the different divisions of the work. Special acknowledgments are due to those members of the staff who have assisted me in those branches of which I have had personal charge; to Mr. John Fixter, the farm foreman, for the careful attention he has given to the special tests made with fertilizers on farm crops; to Mr. George Fixter, for his careful supervision and assistance in the distribution of samples of seed grain; to Mr. James Taggart, for the care and good judgment he has shown as foreman in charge of the lawns and ornamental grounds, and to Mr. Wm. T. Ellis, for the careful work he has done in testing the vitality of seeds, the management of the plants in the green-house, in growing and propagating useful plants for outside decoration, and in the taking of meteorological records.

I desire also to bear testimony to the faithful services of my secretary Mr. Malcolm C. O'Hanly. The employees also of all the farms have my thanks for the interest they have taken in their work and the care with which they have discharged their respective duties.

WM. SAUNDERS,
Director of Experimental Farms.

REPORT OF THE AGRICULTURIST

J. H. Grisdale, B. Agr.

Dr. Wm. Saunders, C.M.G.,
Director Dominion Experimental Farms,
Ottawa.

Sir,—I have the honour to submit herewith reports upon the horses, cattle, sheep, swine and farming operations under my supervision during the past year.

I have to report a fairly successful year in connection with live stock, but the crop returns in 1906 fell very considerably below the average, due largely to exceptional winter weather which destroyed all clover plants in addition to ruining the timothy catch on most new meadows. This most serious state of things was rendered still worse by a too great abundance of moisture in June, drowning about 20 per cent of the grain crop in spite of an excellent drainage system. And to still further injure crop returns July, August and September were months of exceptionally light rainfall, so permitting only light crops of corn and roots and practically allowing of no growth of grass at all. The reports of the returns from the different fields under cultivation attached hereto show clearly the disastrous effects of the various conditions which united to render the husbandman's returns unusually small in this part of Canada in 1906.

The work in my division was as usual carried on with the efficient co-operation of Mr. John Fixter, farm foreman, Mr. C. T. Brettell, herdsman, Mr. Jos. Meilleur, dairyman and Mr. Geo. O. Morisset, secretary, all of whom have lent me their energetic and interested assistance.

Mr. John Fixter having found it to his advantage to assume similar but somewhat more onerous duties at the Macdonald College, Ste. Anne de Bellevue, Quebec, has, I regret to say, left us. His long and faithful service in this division will ever be remembered and appreciated by myself as well as by the farmers of this country. His place has been taken by Mr. Daniel D. Gray, formerly of Point Fortune, Que.

During the year I attended a number of meetings in various parts of Canada and took part in various short courses for farmers and farmers' sons in addition to my regular duties on the Central Experimental Farm.

From April 1, 1906, to March 31, 1907, 2,973 letters were received, and 4,140 despatched by the Agricultural division.

I have the honour to be, sir,
Your obedient servant,
J. H. GRISDALE,
Agriculturist.

LIVE STOCK.

The live stock now (April 1, 1907) occupying the different stables and pens under my charge include horses, cattle, sheep and swine.

HORSES.

The horses are kept for labour exclusively, although some experimental feeding is usually under way to gain some information as to the most economical methods of feeding draught horses, as well as experiments to determine the comparative values of different foods as forage for the same.

The horses are usually nineteen in number, at present made up of:—
Twelve heavy draught horses of Clydesdale and Percheron blood.
Six heavy driving horses.
One light driver.

CATTLE.

There are representatives of four breeds of cattle, viz.:—

Shorthorn, Ayrshire, Guernsey and Canadian. There are besides, a number of grade cattle and steers. These cattle are kept for breeding and feeding operations, mostly of an experimental character. Pure bred breeding animals are usually on sale, however, and a considerable number are sold in the course of the year.

PURE-BRED BREEDING CATTLE.

The pure bred cattle in the barn at present are as follows:—
Eighteen Shorthorns, including three bulls and fifteen females.
Eighteen Ayrshires, including one bull and seventeen females.
Seventeen Guernseys, including four bulls and thirteen females.
Eighteen Canadians, including three bulls and fifteen females.

GRADE CATTLE.

At present the grades number 19 head, made up of 2 Shorthorn grades, 5 Ayrshire grades, 6 Guernsey grades, and 6 Canadian grades.

STEERS.

Thirty-three steers are under feed. They are of different ages and breeding, and the number is made of:—
Twenty two-year-olds.
One yearling.
Twelve calves.

SHEEP.

Sheep are not kept in large numbers, only 26 being now in the pens. Two breeds are kept, namely: Shropshires and Leicesters.

There are 16 Shropshires as follows: 3 yearling rams, 9 aged ewes, and 4 shearling ewes.

There are 10 Leicesters as follows: 6 ewes and 4 rams.

SWINE.

Two hundred and thirty of all classes are now in the pens being fed experimentally or being kept for breeding purposes. The breeds kept are Berkshire, Tamworth and Yorkshire.

The Yorkshires are 142 in number, including 2 stock boars, 39 breeding sows, 101 young pigs.

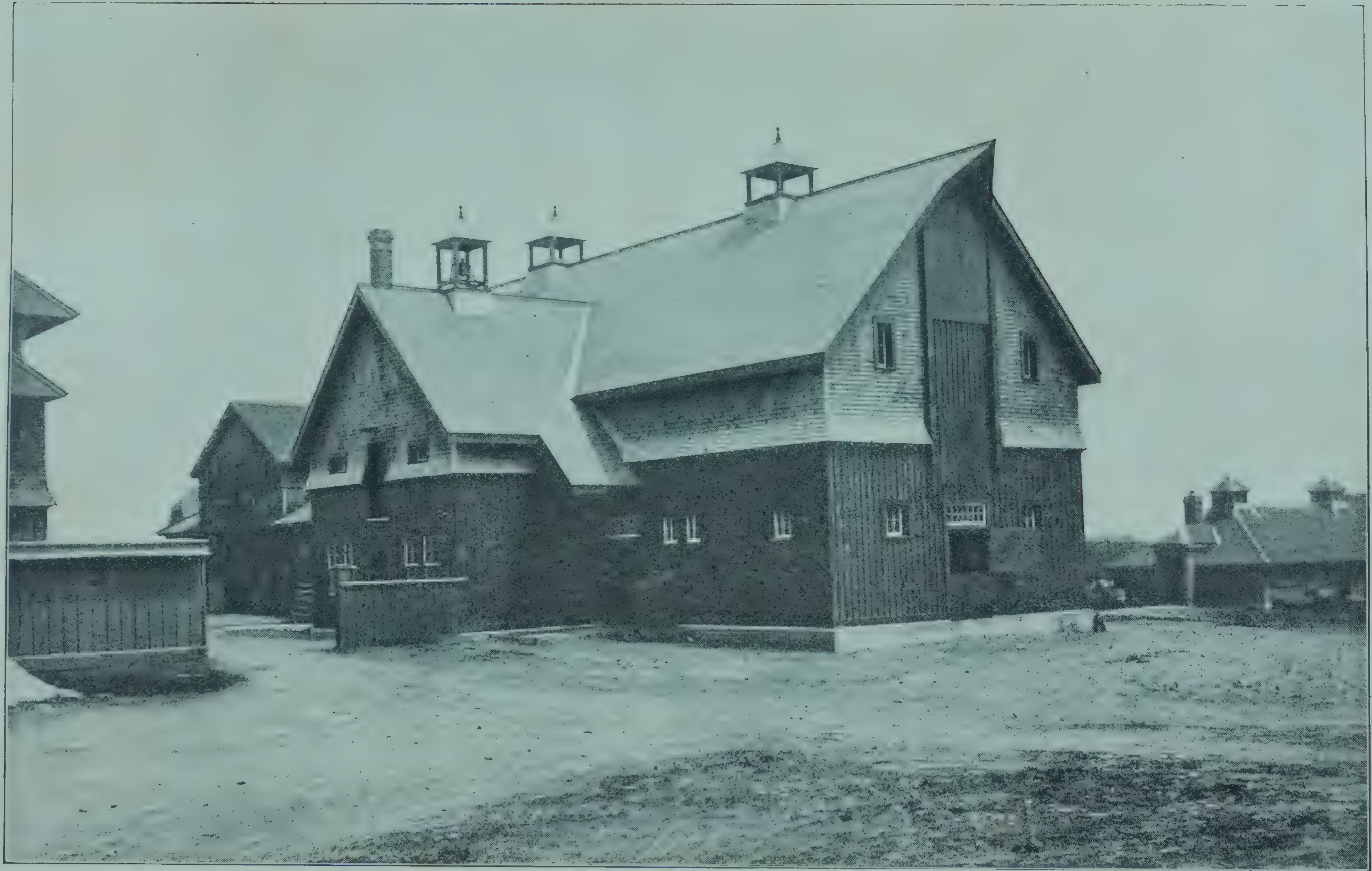
The Berkshires are 31 in number, including 2 stock boars, 9 breeding sows, 20 young pigs.

The Tamworths are 33 in number, including 1 stock boar, 8 breeding sows, 21 young pigs, 3 young boars.

Crossbreds, 14 feeders.

HORSES.

There are 19 horses in the stables. These horses are expected to do the work in the various departments during the year. The work on the '200 acre farm' is but a part of their duties. They work in addition for the horticultural and cereal departments, as well as upon the lawns and in the Arboretum. In addition a large amount of hauling in connection with the different departments, as well as road making and messenger service, takes up much of their time.



HORSE STABLE, CENTRAL EXPERIMENTAL FARM, BUILT 1906. (Photo by F. T. Shutt)

HORSE LABOUR.

During the year from April 1, 1906, to March 31, 1907, the work done by the 19 horses kept in the stables here was equivalent to 5901·7 days work, distributed as follows:—Live Stock, hauling feed, marketing stock, &c., 104 days; farm work (200 acre farm), 813·4 days; draining and care of roads in winter, 54·2 days; manure on 200-acre farm, 356·8 days; cleaning land, gathering stones, &c., 10 days; arboretum, 145·8 days; lawns, &c., 190·2 days; cereal division, 481·1 days; bulletins and reports to and from farm office, 78·9 days; poultry, 29·2 days; mail, including milk delivery, 174 days; omnibus service, including 3 horses for omnibus, 2 horses for general driving and 1 horse for supervision of work, 2,314 days; work about greenhouse, outbuildings, sidewalks, exhibitions, &c., 461·5 days.

In estimating the cost of farming operations further on in this report, $3 per day is charged for team and driver. To feed and care for the horses cost 32½ cents per horse per working day, and the driver receives $1.72½ per 10-hour day. It is evident therefore that the team and driver cost $2.37½ per day, leaving a margin of 62½ cents, or 31¼ cents, nearly, per horse per day for wear and tear.

EXPERIMENTS WITH HORSES.

On January 22, 1907, an experiment to gain some information as to the value of International Stock Food for draught horses was incepted. This was done at the request of a representative of the International Stock Food Co.

The experiment was carried on with five teams of heavy horses. One horse in each team received regularly the amount of Stock Food indicated in directions accompanying the barrel of Stock Food shipped us by the manufacturers. One horse received none of this stock food nor any condimental food of any description whatever. Each horse whether receiving stock food or not received 14 pounds per day of a mixture of 250 pounds of oats and 100 pounds of bran, our standard mixture for heavy horses. First there was some little difficulty in getting the horses to eat up clean the mixture of oats, bran and Stock Food, but they soon learned to take it without difficulty. The experiment might be briefly summarized as follows:—

Number of horses getting International stock food—5.

Average weight, January 22, 1907.	1,569 lbs.
Average weight, March 6, 1907.	1,581 "
Average gain in 42 days.	12 "

Number of horses not getting International stock food—5.

Average weight, January 22, 1907.	1,560 lbs.
Average weight, March 5, 1907.	1,611 "
Average gain in 42 days.	13 "

It would appear therefore that so far as gains in weight are concerned that the stock food was of no value whatever. So far as one could judge of condition of the horses by their appearance and by their spirit when working those not getting stock food were in no way behind their mates which were receiving stock food.

DAIRY CATTLE.

The herd of dairy cattle during the year 1906-7 consisted of 50 females all told. They were:—

Ayrshires.	12
Guernseys.	6
Canadians.	9
Shorthorns.	8

Shorthorn grades	2
Ayrshire grades	4
Canadian grades	2
Guernsey grades	7

FEEDING THE DAIRY COWS.

Summer Feeding.

In summer the area devoted to pasture is necessarily very small since 'The Farm' consists of 200 acres only and it is expected to produce sufficient hay, roots, ensilage and straw to feed from 120 to 160 head of cattle, 19 to 21 horses, 30 to 50 sheep and from 200 to 300 pigs the year around.

Of course it is not attempted to produce sufficient grain to feed this entire stock.

The area devoted to pasture so far as milkers, springers and dry cows were concerned during the summer of 1906, was 14 acres. This would have been far from sufficient to furnish enough food for the 40 head running thereon no matter how favourable the season, hence with such an unfavourable season for grass as 1906 it proved entirely inadequate. To supplement the pasture ensilage was fed in large quantities, meal in limited quantities being at the same time allowed to the cows in milk. It may hardly be said that ensilage was found to be a summer feed more satisfactory in every respect than the commonly used soiling crops, peas, oats, vetches, rye, clover, alfalfa and green corn. It had, however, some most marked advantages, (1) it was always at hand no matter what the weather, nor no matter how busy the teams and men in the field; (2) it was always in good shape to feed, that is did not vary in character to such a degree as to affect the digestive organs as not infrequently happens where soiling crops are fed; (3) it was always palatable to the cattle and eaten with apparent relish no matter how much other food was available, (4) it required a smaller area to furnish a given amount of food than would have been required had soiling crops been used. The only objection that might be raised would be that considerable loss of ensilage is probable from rot on surface of silo where the ensilage is not used regularly owing to varying grass supply.

Winter Feeding.

The roughage ration for the winter months was made up of straw, roots, ensilage and clover hay. The straw was cut, the roots were pulped and a mixture in the proportion of 400 pounds ensilage, 200 pounds roots and 30 pounds cut straw prepared every second day. This mixture being put in a solid pile fermented more or less in a few hours, and the whole mass became quite juicy and apparently very palatable to the cows by the time it was being fed. It was fed at the rate of about 40 pounds per 1,000 pounds live weight of cows fed.

The meal mixture this year was made up of bran 50 parts, ground oats 25 parts, gluten 25 parts. This mixture was fed at the same time as the roughage. Each cow received meal in proportion to the amount of milk she was producing. The amount fed varied from 2 pounds per day up to 13 pounds per day. The meal portion was thrown on top of the roughage the cow had just received and the whole mass given a slight stir so as to mix the meal with the roughage, thus ensuring the two being eaten together. After succulent roughage and meal had been consumed clover hay was fed at the rate of about 2 pounds per cow. The cows were fed in this way at 5.30 in the morning and 4 o'clock in the afternoon.

The above paragraphs refer of course to the plan or system of feeding followed most of the time or when no experiments in feeding are under way. It also describes fairly well the system of feeding we have found to give on the whole the best results.

This system is also the one followed to serve as a check system or basis of comparison where other systems or rations or foodstuffs are being tried.

BREEDING AND FEEDING THE DAIRY CALF.

The robust, healthy, vigorous and probably profitable dairy calf is the result of wise mating and judicious feeding.

THE SIRE.

The sire should have been a pure bred animal coming from heavy milking ancestry on both sides. He should have been kept in good health and in serviceable condition by careful feeding and sufficient exercise. A mature sire is likely to throw more vigorous stock than a young immature animal. Bulls may be expected to prove efficient as stock getters till 8 or 9 years of age and even later.

THE DAM.

The cow should be kept in good health and in good condition while carrying a calf. Particularly is this true the 6 or 8 weeks immediately preceding delivery. The mature cow should be dried off at least 6 weeks previous to dropping the next calf.

In the case of the heifer with her first calf she should have been fed generously and wisely during the whole period of pregnancy. Her food should have been such as would have been suitable for a cow in full flow of milk. The most suitable foods being pasture grass, clover hay, roots, ensilage, bran, oats and oil meal. She should drop her first calf when about 2 years old.

THE CALF TO RAISE.

Objection is sometimes made to raising calves from heifers. If the heifers have been properly mated and wisely fed during pregnancy the calves are likely to prove as satisfactory as stock from older cows. In the case of grade heifers, however, it may scarcely be considered wise to raise the first calf since the milking qualities being unknown the breeder might later find himself with a six or nine months calf from an unsatisfactory cow on his hands.

AT CALVING TIME.

The cow should be placed in a box stall a few days before due to calve. She should be kept on a somewhat lighter ration than usual and her food should be rather laxative in character, bran, clover, roots or ensilage.

The calf may be left with her for two or three days. She should be milked in addition to what the calf draws from her. In the case of very heavy milking cows likely to suffer from milk fever it is advisable to stop short of drawing off all the milk for three or four days. This practice has saved us all trouble from milk fever for the last five or six years.

Only a light ration should be fed for several days after calving and the cow should be brought to full feed very gradually, say in three weeks after parturition.

FEEDING THE CALF.

The calf should be removed from the cow the second or third day. It should then be taught to drink. This may be done about as follows:—Take a quart of warm new milk in a 10 quart pail. Give the calf two fingers to suck air between. Gradually lower its nose into the pail. When it finds milk instead of air entering between the fingers it is likely to relax the neck and start to take milk. Do not sink the nose so far into the milk as to cover the nostrils. If it will not drink at first, leave it for a few hours to work up an appetite. After a few days it may gradually be weaned from the fingers.

Whole milk should be fed for at least one week. During the next week the change from whole milk to skim milk should gradually be brought about. Substitute each day a regularly increasing proportion of skim milk for the same amount of whole milk withdrawn.

The skim milk should be fed warm, from 90 to 100 degrees Fahr., no more, no less. To replace the fat removed from the skim milk as well as to furnish additional protein, it is well to add some flaxseed jelly to the ration. This jelly should be added in small quantities at first and slowly increased. Begin with a desertspoonful in each portion and gradually increase until about a cupful is being fed night and morning to the three months old calf.

To prepare the jelly, boil or rather steep one pound of whole flaxseed in water almost boiling until a thick paste results. Another method of preparation is to take half a cup of ground flax in a quart of water and allow to simmer just below the boiling point until a thick jelly is formed. It should be kept cool and sweet until fed.

In addition to the flax jelly a little dry bran and whole oats should be fed. Start with very small quantities. Some clean sweet clover hay will be a valuable addition to the ration at a very early age.

Whey may be used where skim milk is not to be had. Change from milk to whey as from whole milk to skim milk (see method outlined above). The flax seed meal jelly, &c., should be used just as with skim milk.

Where skim milk or whey is not available calves may be raised on hay tea. Boil cut clover or even timothy in water until a strong decoction or tea is obtained. Wean the calf from milk to this tea precisely as described from whole milk to skim milk above. The same supplementary feeds may be used in somewhat larger quantities.

The skim milk should be fed sweet for some time at least. If it is likely, however, that it will sometimes be sour it is advisable to gradually change to sour milk and feed sour milk invariably. The same counsel applies to whey.

Calves should be kept in scrupulously clean pens. These should be dry and warm in winter and cool and dry in summer.

A strict observance of the following general directions will almost certainly ensure success:

1. Treat calves kindly and carefully.
2. Be scrupulously clean as to food, pails or troughs and pens or quarters.
3. Make all changes in character of food very gradually. This applies whether changes be as to temperature percentage of butter-fat, acidity or sweetness, quantity, times of feeding, or any other feature in connection with the food.
4. Feed only wholesome food, feed regularly, and feed in sufficient quantities but not too generously.

DAIRY COW RECORDS.

KEEPING RECORDS.

The effort to interest dairymen in the returns from their individual cows has been continued, and many farmers seem to be awakening to a knowledge of the fact that the improvement of the whole herd demands the study of the unit; that is a close acquaintance with the expenditure upon the individual cow and the returns from the same.

This can be determined in no other way than by keeping an exact record of the daily milk yield. A record of the daily food consumption would also be of great use if it could be kept.

Many farmers who have been keeping such records for some time report very strongly in favour of this kind of work.

As soon as the farmer sets to work to know what his cows are doing by keeping a record he finds himself much more closely in touch with his business. He sees at once the effect of better care and better feeding. He notes the great difference in returns between the best and the worst cows in his herd and cannot help but determine to get rid of the poor ones and replace them with good ones. Even the poor cows are improved because better feeding is almost certain to be tried, and quite certainly poor feeding is responsible for many of our unprofitable dairy cows and even for many unprofitable dairy herds.

To facilitate the keeping of such records and to help in the building up of dairying interests in Canada, forms similar to the following are supplied on application:—

DAILY MILK RECORD.

Herd belonging to........................
Post Office........................
Record for week ending........................

(This form supplied free by Live Stock Division, Central Experimental Farm, Ottawa, Ont.)

COWS.

Day.	Time.																	Total for day.
Sunday	Morning																	
	Evening																	
Monday	Morning																	
	Evening																	
Tuesday	Morning																	
	Evening																	
Wednesday	Morning																	
	Evening																	
Thursday	Morning																	
	Evening																	
Friday	Morning																	
	Evening																	
Saturday	Morning																	
	Evening																	
Total	Week																	

(Reverse)

CENTRAL EXPERIMENTAL FARM.

Wm. Saunders, Director. J. H. Grisdale, Live Stock and Agriculture.

MILK RECORDS.

1. The profitable dairy cow must give over 5,000 pounds of milk each year. To know the value of a cow, her total annual yield of milk must be known. The only way to know this is to keep a record of her daily milk yield.

2. The form on the other side of this sheet is intended to help progressive dairy farmers by supplying them with a simple and convenient sheet for the keeping of the milk records of their individual cows. A study of such records will soon indicate

which cows should go to the butcher. We would be pleased to receive a summary of your record. If you have no summary forms, write us.

3. Such records are being kept by hundreds of successful dairymen to-day. Many of these men attribute their success to the keeping of such records. Why not give the thing a trial if you are a dairyman? It will increase your milk product. It will lighten your labour since your interest will be increased in your work, and 'interest lightens labour.' It will show you the unprofitable cow the 'boarder.' You cannot get rid of her too quickly.

4. For weighing the milk a simple spring balance may be secured for from one and a half to four dollars. If your local dealer cannot supply you, write the undersigned for particulars. A small platform scale is fairly convenient, but we find the spring balance preferable.

5. Many farmers keep records of the amount of food fed to individual cows. If you would like to do so, sample forms would be sent free on writing J. H. Grisdale, Agriculturist, Central Experimental Farm, Ottawa, Ont.

COST OF FEEDING.

In estimating the cost of feeding, the following prices were charged for feed stuffs, being the average local market rates for the same during the season of 1905, save in the case of ensilage and roots, which are charged for at the rate usually affixed in experimental feeding in all parts of Amreica.

Pasture (per month)	$ 1 00	per cow.
Bran	16 00	per ton.
Gluten meal	25 00	"
Oil meal	30 00	"
Oats and barley	21 00	"
Clover hay	7 00	"
Chaff	4 00	"
Roots and ensilage	2 00	"

In estimating the value of the product, 22 cents per pound is allowed for the butter and 15 cents per 100 pounds for the skim milk. The butter sells at from 25 to 32 cents per pound and it is considered that as feeds are dearer and wages higher and average prices for dairy products in Canada very much higher than a few years ago, the increase from 20 to 22 is necessary and justifiable to permit of comparing our results with those obtained by farmers in different parts of Canada.

The Central Experimental Farm dairy herd records as given below make only a moderate showing. No effort is being made just at present to get particularly large yields from the cattle, the aim now being to get some good breeding stock. As will be noted the pure bred cows are being milked for rather shorter periods than usual. This is on account of their being bred to come in at as short intervals as possible.

In the groups of three cows of each breed and three grades it will be noticed that the grades are being milked longer periods than the pure breds, hence make a somewhat better showing.

COW RECORDS FOR NINE MONTHS, JULY 1, 1905, TO MAR. 30, 1906.

Names of Cows.	Age.	Date of dropping last calf.	Number of days in milk.	Daily average yield of milk. Lbs.	Total milk for period. Lbs.	Per cent fat in milk. p. c.	Pounds butter produced in period. Lbs.	Value of butter at 22 cts. per lb. $ cts.	Value of skim milk at 15 cents per 100 lbs. $ cts.	Total value of product. $ cts.	Amount meal eaten, valued at 1c. per lb. Lbs.	Amount of roots and ensilage eaten valued at $2 per ton. Lbs.	Amt. hay eaten valued at $7 per ton. Lbs.	Months on pasture at $1 per month.	Total cost of feed for period. $ cts.	Cost to produce 100 lbs. milk. cts.	Cost to produce 1 lb. butter, skim milk neglected. cts.	Profit on 1 lb. of butter, skim milk neglected. cts.	Profit on cow during period, labour neglected. $ cts.
Countess........(G.A.)	..	June 18, '05	254	34·4	8,748	3·7	390·	85 80	13 53	99·33	2,185	11,810	875	2	38 72	44·2	9·9	12·1	60 61
Itchen Lady........(G)	9	Mar. 10, '06	182	28·0	5,018	4·3	258·36	56 84	7 13	63·97	1,324	11,350	875	2	29 65	59·8	11·4	10·6	34 32
Jessie A............(A)	12	Jan. 22, '06	193	31.5	6,075	3·6	264·08	58 10	8 71	66·81	1,677	11,500	875	2	33 33	54·8	12·6	9·4	33 48
Zamora.........(C.)	10	Sept. 7, '06	251	25·1	6,317	4·7	349·3	76 84	9 09	85·93	1,798	11,800	875	2	34 84	55·1	9·9	12·1	51 04
Darlington II. ......(S.)	..	Oct. 31, '05	213	24·4	5,200	4·0	247·16	54 38	7 42	61·80	1,698	11,350	785	2	33 08	63·6	13·3	8·7	28 72
Polly .... (G.C.)	11	Feb. 27, '06	184	23·5	4,336	3·9	202·91	44 64	6 19	58·45	1,344	11,500	875	2	30 00	69·2	14·3	7·7	28 45
Alma...........(G.G.)	5	Jan. 17, '06	182	24·9	4,545	4·6	249·41	54 87	6 44	61·31	1,706	11,660	875	2	33 78	74·8	13·5	8·5	27 53
Marjorie...........(A.)	4	Oct. 10, '05	219	23·9	5,247	3·9	243·88	53 65	7 50	61·15	1.727	11,500	855	2	33 76	64·3	13·8	8·2	27 39
Maggie............(A.)	10	May 25, '06	209	23·2	4,834	3·8	219·70	48 33	6 14	54·47	1,223	11,500	875	2	28 79	59·6	13·1	8·9	25 68
Deanie.............(G.)	9	Dec. 7, '05	189	23·6	4,469	4·4	232·39	51 24	6 35	57·59	1,576	11,350	875	2	32 17	71·5	13·8	8·2	25 42
Dora.............(G.G.)	..	Sept. 26, '05	182	18·0	3,283	5·4	210·13	46 23	4 51	50·74	1,267	10,300	783	....	25 71	78·0	12·2	9·8	25 03
Flavia.............(A.)	4	Dec. 6, '05	224	23·1	5,196	3·8	232·82	51 22	6 43	57·65	1,613	11,500	875	2	32 69	62·9	14·0	7·9	24 96
Queenie..........(G.G.)	8	Mar. 26, '06	214	13·3	2,849	6·1	207·35	45 62	3 96	49·58	1,071	11,200	875	2	26 97	94·6	13·0	8·9	22 61
Gurta.... ....(A.)	5	Oct. 4, '05	174	30·3	5,274	3·3	207·57	45 67	7 60	53·27	1,582	11,500	875	2	32 38	61·3	15·6	6·4	20 89
Beauty ... .(G.G.)	5	Mar. 7, '05	188	23·8	4,476	4·0	214·28	47 14	6 39	53·53	1,638	11,350	875	2	32 79	73·2	15·3	6·7	20 74
Bellflower... ....(G.G.)	8	Feb. 23, '06	220	19·5	4,300	4·1	211·70	46 57	6 13	52·70	1,565	11,660	875	2	32 37	75·2	15·3	6·7	20 33
Bloomer...........(A.)	7	Jan. 15, '06	162	25·2	4,076	3·6	174·23	38 23	8 72	46·95	1,350	11,440	787	2	29 59	72·5	16·9	5·1	17 36
Fortune......... .(C.)	10	Dec. 21, '05	182	27·5	5,006	4·0	186·09	40 94	7 33	48·22	1,571	11,800	785	2	32 26	64·4	17·3	4·7	15 96
Rosy.............(G.S.)	7	" 30, '05	218	21·5	4,689	3·0	193.48	42 57	6 74	49·31	1,818	11,810	875	2	35 05	74·7	18·1	3·9	14 26
Duchesse.......... (C.)	5	July 12, '05	222	17·5	3,899	3·7	172·36	37 92	5 59	43·51	1,351	11,800	875	2	30 37	77·8	17·6	4·4	13 14
Ruby..............(G.)	9	Sept. 1, '05	212	15·2	3,240	4·6	179·51	39 49	4 59	44·08	1,453	11,350	935	2	31 15	96·0	17·3	4·7	12 93
Denty Girl.........(A.)	..	Nov. 25, '05	121	23·5	2,854	3·7	125·01	27 68	4 08	31·76	1,024	7,260	633	....	19 72	69·0	15·6	6·4	12 04
Pearl... ....(G.)	..	Feb. 24, '06	118	21·3	2,520	5·0	149·20	32 92	3 75	36·57	1,013	11,200	875	2	26 39	104·7	17·7	4·3	10 18
Inoquette..........(C.)	..	Dec. 16, '06	90	19·9	1,777	4·5	94·64	20 82	2 52	23·34	658	5,360	540	....	13 83	74·8	14·6	7·4	9 51
Marchioness....... (S.)	12	Mar. 4, '05	254	14·7	3,741	3·7	166·42	36 61	5 36	41·97	1,672	11,350	875	2	33 13	88·5	19·9	2·1	8 84
Dolly.......... (G.A.)	..	Sept. 4, '05	186	21·2	3,945	3·2	150·82	33 18	5 69	38·87	1,368	11,500	875	2	30 24	76·6	20·0	1·9	8 63
Legacy.............(A.)	4	Mar. 1, '06	189	14·6	2,978	4·1	146·11	32 14	4 25	36·39	1,176	11,500	875	2	28 32	95·0	19·3	2·7	8 37
Dott ....(G.G.)	..	Sept. 26, '05	182	13·6	2,485	4·0	129·24	28 43	3 53	31·96	1,236	10,300	785	....	25 41	102·0	19·6	2·4	6 55
Molly II.......... (S.)	..	Oct. 20, '05	146	17·4	2,533	3·8	113·36	24 94	3 63	28·57	1,204	9,060	723	....	23 63	93·2	20·8	1·2	4 94
Réjane.. ... .(C.)	..	Jan. 29, '06	59	15·3	908	4·7	50·97	11 21	1 28	12·49	416	3,540	354	....	8 94	98·4	17·5	4·5	3 55
Poupée............(C.)	3	Feb. 18, '06	180	13·7	2,481	4·0	117·81	25 92	3 54	29·46	1,200	11,345	875	2	28 40	114·0	24·1	*1·9	1 06

* Loss.

COW RECORDS FOR NINE MONTHS JULY 1, 1905, TO MARCH 30, 1906.—*Con.*

Names of Cows.	Age.	Date of dropping last calf.	Number of days in milk.	Daily average yield of milk.	Total milk for period.	Per cent fat in milk.	Pounds butter produced in period.	Value of butter at 22 cts. per lb.	Value of skim milk at 15 cents per 100 lbs.	Total value of product.	Amount meal eaten, valued at 1c. per lb.	Amount of roots and ensilage eaten valued at $2 per ton.	Amt. hay eaten valued at $7 per ton.	Months on pasture at $1 per month.	Total cost of feed for period.	Cost to produce 100 lbs. milk.	Cost to produce 1 lb. butter, skim milk neglected.	Profit on 1 lb. of butter, skim milk neglected.	Profit on cow during period, labour neglected.
				Lbs.	Lbs.	p. c.	Lbs.	$ cts.	$ cts.	$ cts.	Lbs.	Lbs.	Lbs.		$ cts.	cts.	cts.	cts.	$ cts.
Eva . ...(G.C.)	..	Mar. 7, '06	25	14·5	363	4·5	19·63	4 32	51	4·83	200	1,860	186	....	4 51	124·0	22·9	* ·9	32
Queen Clatina......(G.)	..	Jan. 5, '06	59	12·3	731	4·6	40·38	8 88	1 03	9·91	472	3,540	354	....	9 50	130·0	23·5	*1·5	41
Flossy's Gem.......(G.)	..	Dec. 30, '05	84	11·6	975	4·4	50·68	11 15	1 43	12·58	592	5,400	540	....	13 21	135·0	26·0	*4·0	* 63
Denty..............(A.)	7	Apl. 11, '05	133	15·0	2,002	3·9	93·95	20 67	1 85	22·52	946	11,500	875	2	26 02	129·9	27·6	*5·6	*3 50
Alice...........(G.A.)	5	....	195	13·0	2,518	3·1	94·40	20 76	3 63	24·39	1,157	11,500	875	2	28 13	112·0	29·8	*7 8	*3 74
Cora...... .....(G.A.)	3	Jan. 1, '06	186	10·9	1,942	3·9	89·50	19 69	1 74	21·43	1,141	9,450	689	2	25 27	130·0	27·1	*5 1	*3 84
Jessica............(S.)	5	" 29, '06	103	12·1	1,253	3·9	57·64	12 68	2 79	15·47	827	11,250	875	2	24 68	197·0	42·9	*20·9	*9 21
Janet........ ....(S.)	5	Dec. 1, '05	70	19·4	1,359	4·3	69·17	15 22	2 93	18·15	1,360	11,500	785	2	29 85	219·0	43·1	*21·1	*11 70
Duchess .. ..(S.)	5	Mar. 23, '05	81	15·2	1,232	4·1	60·24	13 25	2 75	16·00	1,366	11,500	875	2	30 22	245·0	50·1	*27·9	*14 22

* Loss.

COW RECORDS FOR YEAR, APRIL 1, 1906 TO MARCH 31, 1907.

Name of Cows.	Age.	Date of dropping last calf.	Number of days in milk.	Daily average yield of milk.	Total milk for year.	Per cent fat in milk.	Pounds butter produced in year.	Value of butter at 22 cents per lb.	Value of skim milk at 15 cts. per 100 lb.	Total value of product.	Amount meal eaten valued at 1c. per pound.	Amount of roots and ensilage eaten, valued at $2 per ton.	Amount hay eaten valued at $7 per ton.	Months on pasture at $1 per month.	Total cost of feed for year.	Cost to produce 100 lbs. milk.	Cost to produce 1 lb butter, skim milk neglected.	Profit on 1 lb. butter, skim milk neglected.	Profit on cow during year, labor neglected.
				lbs.	lbs.	%	lbs.	$ cts.	$ cts.	$ cts.	lbs.	lbs.	lbs.	Mos	$ cts.	cts.	cts.	cts.	$ cts.
Queenie .... (G.G.)	9	Mar. 26, '06	365	17·7	6,465	6·3	480·52	105 71	8 98	114 69	2,130	17,100	1,002	4	45 90	79·8	9·5	12·5	68 79
Itchen Lady .... (G.)	10	Jan. 13, '07	280	26·3	7,390	5·0	434·90	95 68	10 43	106 11	2,103	16,570	1,002	4	45 11	61·0	10·3	11·7	61 00
Alma .... (G.G.)	6	" 17, '06	314	22·8	7,183	4·9	415·08	91 31	10 15	101 46	2,344	17,250	1,000	4	48 19	67·0	11·6	10·4	53 27
[illegible]	12	Feb. [illegible]7, '06	365	22·7	8,301	4·1	400·08	88 11	11 85	99 96	2,285	17,560	940	4	47 70	57·4	11·7	10·3	52 26
Deanie .... (G.)	10	Jan. 1, '06	300	21·8	6,980	4·6	385·34	84 77	9 79	94 56	2,219	16,725	1,002	4	46 43	66·0	12·4	9·6	46 43
Maggie .... (A.)	11	May 25, '06	282	27·6	7,242	4·2	366·06	80 53	10 51	90 84	2,043	17,490	912	4	45 11	66·2	12·4	9·6	45 73
Denty .... (A.)	8	Apr. 11, '06	245	30·4	7,466	4·1	363·30	79 93	10 65	90 58	2,166	17,640	912	4	46 49	64·9	12·7	9·3	44 09
Zamora .... (C.)	11	Sept. 7, '06	299	20·5	6,156	5·2	379·98	83 64	8 64	92 24	2,491	17,770	1.002	4	50 19	81·5	13·2	8·8	42 05
Pearl .... (G.)	..	Jan. 9, '07	283	20·3	5,778	5·1	349·53	77 90	8 14	85 04	2,010	16,735	1,004	4	44 35	76·7	12·7	9·3	40 69
Bellflower .... (G.G.)	..	Feb. 23, '06	365	19·3	7,076	4·2	351·94	77 43	10 09	87 52	2,314	17,045	1,002	4	47 69	67·*	13·5	8·5	39 83
Jessie A. .... (A.)	13	Jan. 22, '06	249	28·3	7,060	3·9	327·50	72 05	10 10	82 15	2,285	16,870	878	4	46 79	66·2	14·2	7·8	35 36
Dora .... (G.A.)	..	Nov. 20, '06	254	18·0	4,572	5·9	321·03	70 63	6 45	77 08	1,979	17,180	1,002	4	44 48	97·2	13·8	8·2	32 60
Darlington II. .... (S.)	..	Oct. 31, '05	332	19·9	6,627	3·9	308·66	67 90	9 50	77 40	2,255	17,180	971	4	47 12	71·1	15·2	6·8	30 28
Flavia .... (A.)	5	Jan. 5, '07	269	24·1	6,845	3·7	302·98	66 66	9 27	75 93	2,125	17,460	912	4	45 90	67·0	15·1	6·9	30 03
Fortune .... (C.)	11	Mar. 29, '07	255	23·1	5,896	4·8	332·62	63 18	8 34	71 52	2,193	17,180	1,002	4	46 62	79·0	14·0	7·9	24 90
Poupée .... (C.)	4	Apr. 6, '06	286	19·1	5,702	3·9	266·07	58 64	8 15	66 79	1,953	16,290	1,002	4	43 33	75·9	16·2	5·8	23 46
Illuminata II. .... (S.)	..	Feb. 23, '06	355	16·4	5,824	3·8	266·44	58 62	8 34	66 96	1,960	17,180	1,001	4	44 28	76·0	16·6	5·4	22 68
Legacy .... (A.)	5	Mar. 1, '06	241	20·5	4,943	3·7	218·11	47 98	7 09	55 07	1,648	10,510	549	4	32 91	66·5	15·8	6·2	22 16
Marjorie .... (A.)	5	Dec. 28, '06	246	22·6	5,580	3·9	257·80	56 72	7 98	64 70	1,880	17,490	912	4	43 48	77 9	16·8	5·2	21 22
Inoquette .... (C.)	..	Feb. 26, '07	300	16·2	4,865	4·3	248·82	54 74	6 92	61 66	2,095	16,260	1,002	4	44 72	91·9	17·9	4·1	16 94
Whitie .... (G.S.)	..	Dec. 14, '06	282	18·6	5,264	4·1	258·58	56 87	7 51	64 38	2,224	17,180	961	4	47 77	90·7	18·4	3·6	16 61
Gurta .... (A.)	6	Jan. 12, '06	241	21·9	5,285	3·9	242·77	53 41	7 53	60 94	2,022	17,460	912	4	44 87	84·9	18·4	3·6	16 07
Alice .... (A.G.)	6	Mar. 29, '07	287	17·9	5,138	3·3	201·45	44 32	7 41	51 73	1,556	13,720	732	4	35 84	69·7	17·7	4·3	15 89
Maggie III. .... (A.)	..	Aug. 9, '06	108	19·6	2,118	4·5	103·80	23 94	3 02	26 96	516	4,090	273	1	11 21	52 8	10·7	11·3	15 75
Ruby .... (G.)	10	Sept. 18, '06	233	17·1	3,991	4·7	223 96	49 27	5 65	54 92	1,581	16,580	1,002	4	39 90	100·0	18·2	3·8	15 02
Duchesse II .... (C.)	..	Dec. 18, '06	101	22·3	2,256	4·1	119·07	26 19	3 20	29 39	720	6,070	363	–	14 54	64·0	12·2	9·8	14 85
Ottawa Spot .... (G.)	..	Aug. 31, '06	211	14·3	3,037	4·2	152·71	33 60	4 33	37 93	1,146	10,610	633	1	25 29	83·2	16·5	5·5	12 64
Countess .... (G.A.)	.	....	92	24·4	2,252	3·9	105·08	23 12	3 22	26 34	1,011	4,830	276	–	15 90	70·6	14·1	7·9	10 44
Illuminata III .... (S.)	..	Sept. 1, '06	187	16·1	2,023	3·7	134·14	29 51	4 33	33 84	1,092	10,760	636	1	24 90	82·6	18·5	3·5	8 94
Poupée II .... (C.)	..	Jan. 1, '07	83	21·3	2,210	3·9	81·33	17 89	2 54	20 43	481	4.810	270	–	10 57	59·6	12·9	9·1	9 86
Rosy .... (S.G.)	8	....	61	24·7	1,508	3·4	60·60	13 33	2 17	15 50	488	3,350	183	–	8 87	58·8	14·6	7·4	6 63
Queen Clatina .... (G.)	..	Jan. 3, '07	295	12·2	3,616	4·6	199·85	43 97	5 12	49 09	1,886	16,560	1,002	4	42 93	118·8	21·4	·6	6 16
Réjane .... (C.)	..	" 29, '06	243	10·3	2,527	4·9	147·64	32 48	3 57	36 05	1,525	9,420	639	4	30 90	122·2	20·2	1·8	5 15

COW RECORDS FOR YEAR, APRIL 1, 1906, TO MARCH 31, 1907.—*Con.*

Names of Cows.	Age.	Date of dropping last calf.	Number of days in milk.	Daily average yield of milk.	Total milk for year.	Per cent fat in milk.	Pounds butter produced in year.	Value of butter at 22 cents per lb.	Value of skim milk at 15 cts. per 100 lbs.	Total value of product.	Amount meal eaten valued at 1c. per pound.	Amount of roots and ensilage eaten, valued at $2 per ton.	Amount hay eaten valued at $7 per ton.	Months on pasture at $1 per month.	Total cost of feed for year.	Cost to produce 100 lbs. milk.	Cost to produce 1 lb. butter, skim milk neglected.	Profit on 1 lb. butter, skim milk neglected.	Profit on cow during year, labour neglected.
				lbs.	lbs.	%	lbs.	$ cts.	$ cts.	$ cts.	lbs.	lbs.	lbs.		$ cts.	cts.	cts.	cts.	$ cts.
Beauty............(G.G.)	6	....	62	22·2	1,373	4·0	64·61	14 21	1 95	16 16	517	3,350	183	2	11 16	81·0	17·2	4·8	5 00
Fanny..........(G.A.)	..	Oct. 19, '06	161	12·4	1,982	4·2	97·89	21 54	2 83	24 37	904	8,780	546	–	19 73	99·5	21·5	·5	4 64
Dolly............(G.G.)	..	Sept. 4, '05	270	14·3	3,883	4·0	174·90	38 48	5 90	44 38	1,581	17,190	850	4	39 98	103·0	22·8	*·8	4 40
Eva............(G.C.)	..	Apr. 1, '07	314	10·1	3,186	4·9	183·74	40 42	4 50	44 92	1,644	16,861	950	4	40 63	127·5	22·1	*·9	4 29
Denty III...........(A.)	..	Jan. 31, '07	31	18·4	572	4·2	28·25	6 21	82	7 03	186	1,550	93	–	3 75	65·5	13·2	8·8	3 28
Duchesse..........(C.)	6	July 6, '06	247	17·2	4,252	3·6	181·18	39 85	6 15	46 00	1,890	16,590	1,002	4	43 00	101·1	23·7	*1·7	3 00
Maggie II..........(A.)	..	....	61	15·5	948	3·8	43·36	9 54	1 41	10 95	488	3,350	183	–	8 87	93·0	20·2	1·8	2 08
Flora............(G.G.)	..	... ...	31	14·9	464	4·1	22·91	5 04	66	5 70	186	1,550	93	–	3 75	80·8	16·3	5·7	1 95
Ottawa Fortune...(C.)	.	Oct. 22, '06	159	10·2	1,631	4·3	83·91	18 46	2 32	20 78	844	8,480	636	–	19 15	117·4	22·8	*·8	1 63
Denty Girl ....(A.)	..	....	184	13·9	2,571	3·9	118·68	26 11	3 08	29 19	1,250	10,510	549	4	28 93	112·5	24·3	*2·3	26
Ottawa Marchioness..(S)	..	Jan. 10, '06	311	11·8	3,687	4·1	180·48	39 71	5 38	45 09	2,071	17,180	971	4	45 28	125·4	25·0	*3·0	* 19
Flecky II..........(A.)	..	Dec. 1, '06	30	9·6	288	3·6	12·51	2 55	42	2 97	186	1,550	90	–	3 66	127·4	29·2	*7·2	* 69
Dott............(G.G.)	..	" 6, '06	217	14·3	3,106	4·2	151·69	33 37	3 42	36 79	1,759	16,920	1,002	4	42 02	135·2	27·2	*5·2	*5 23
Molly II............(S.)	..	Oct. 20, '05	251	12·6	3,142	4·0	150·30	33 07	4 49	38 56	2,075	17,180	971	4	45 32	144·0	31 5	*10·5	*6 76
Jessica.............(S.)	6	Jan. 22, '06	261	10·5	2,741	4·2	134·93	29 68	4 20	33 88	1,673	17,180	971	4	41 30	150·0	36·0	*14·0	*7 52
Janet.............(S.)	6	Dec. 1, '05	175	14·0	2,464	4·0	117·66	25 88	3 52	29 40	1,764	17,180	971	4	42 21	171·0	35·8	*13·8	*12 81
Duchess............(S.)	6	Nov. 23, '05	148	11·3	1,676	4·0	95·90	21 98	2 36	24 34	1,590	17,180	971	4	40 42	241·0	42·1	*20·1	*16 08

Names of Cows.	Age.	Date of dropping last calf.	No. of days in milk.	Daily average yield of milk.	Total milk for year.	Per cent fat in milk.	Pounds of butter produced in year.	Value of butter at 22c. per pound.	Value of skim milk at 15c. per cwt.	Total value of product for year.	Amount meal eaten at 1c. per lb.	Amt. roots and ensilage eaten valued at $2 per ton.	Amt. hay valued at $7 per ton.	Months on pasture at $1 per mo.	Total cost of feed for year.	Cost to produce 100 lbs. milk.	Cost to produce 1 lb. butter, skim milk neglected.	Profit on 1 lb. butter, sk. milk neglected.	Profit on cow during year, labour neglected.
				lbs.	lbs.	%	lbs.	$ cts.	$ cts.	$ cts.	lbs.	lbs.	lbs.	mos	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
AYRSHIRES.																			
Maggie	11	May 25, '06	282	27·6	7,242	4·2	366 06	80·53	10·51	90·84	2,043	17,490	912	4	45 11	66·2	12·4	9·6	45 73
Denty	8	Apl. 11, '06	245	30·4	7,466	4·1	363·30	79·93	10·65	90·58	2,166	17,640	912	4	46 49	64·9	12·7	9·3	44 09
Jessie A.	13	Jan. 22, '06	249	28·3	7,060	3·9	327·50	72·05	10·10	82·15	2,285	16,870	878	4	46 79	66·2	14·2	7·8	35 36
CANADIANS.																			
Zamora	11	Sept. 7, '06	299	20·5	6,156	5·2	379·98	83·64	8·64	92·24	2,491	17,770	1,002	4	50 19	81·5	13·2	8·8	42·05
Fortune	11	Mar. 29, '07	255	23·1	5,896	4·8	332·62	63·18	8·34	71·52	2,193	17,180	1,002	4	46 62	79·4	14·	7·9	24·90
Poupée	4	Apl. 6, '06	286	19·1	5,702	3·9	266·07	58·64	8·15	66·79	1,953	16,290	1,002	4	43 33	75·9	16·2	5·8	23·46
GUERNSEYS.																			
Itchen Lady	10	Jan. 13, '07	280	26·3	7,390	5·	434·90	95·68	10·43	106·11	2,103	16,570	1,002	4	45 11	·61	10·3	11·7	61·00
Deanie	10	Jan. 1, '06	300	21·8	6,980	4·6	385·34	84·77	9·79	94·56	2,219	16,725	1,002	4	46 43	·66	12·4	9·6	46·43
Pearl	..	Jan. 9, '07	283	20·3	5,778	5·1	349·53	77·90	8·14	85·04	2,010	16,735	1,004	4	44 35	7·67	12·7	9·3	40·69
SHORTHORNS.																			
Darlington II.	..	Oct. 31, 1905	332	19·9	6,627	3·9	308·66	67·90	9·50	77·40	2,225	17,180	971	4	47 12	71·1	15 2	6·8	30·28
Illuminata II.	..	Feb. 23, '06	355	16·4	5,824	3·8	266·44	58·62	8·34	66·96	1,960	17,180	1,001	4	44 28	76·	16·6	5·4	22·68
Illuminata III.	..	Sept. 1, '06	187	16·1	2,023	3·7	134·14	29·51	4·33	33·84	1,092	10,760	636	1	24 90	82·6	18·5	3·5	8·94
THREE GRADES.																			
Quennie G. g.	9	Mar. 26, '06	365	17·7	6,465	6·3	480·52	105·71	8·98	114·69	2,130	17,100	1,002	4	45 90	79·8	9·5	12·5	68·79
Alma G. g.	6	Jan. 17, '06	314	22·8	7,183	4·9	415·08	91·31	10·15	101·46	2,344	17,250	1,000	4	88 19	6·7	11·6	10·4	53·27
Polly C. g.	12	Feb. 27, '06	365	22·7	8,301	4·1	400·08	88·11	11·85	99·96	2,285	17,560	940	4	47 70	57·4	11·7	10·3	52·26

GLUTEN, OIL MEAL, COTTON SEED MEAL VS. BRAN AND OATS.

During the winter of 1906-7 an experiment was undertaken to gain some information as to the value of gluten, oil meal, and cottonseed meal as feeds in comparison with bran and oats.

The tables which follow give a full history of the experiment.

It will be seen that while these feeds, especially oil meal and gluten, checked the falling off in milk flow they at the same time raised the cost of production so that the period when bran was being fed holds first place in economy. Gluten meal period is very close behind, however, and has the advantage of having not only checked the natural decrease in milk flow but even induced a slight increase.

VALUES OF MIXTURES.

Oats and bran mixture, equal parts..	$20 00	per ton.
Oats, bran and gluten meal mixture, equal parts	21 60	"
Oats, bran and oil meal mixture, equal parts.. ..	23 40	"
Oats, bran and cottonseed meal mixture, equal parts	23 60	"

These were the prices the feeds cost us.

GROUP I.—Bran, Oats, Gluten, Oil Meal and Cotton Seed Meal Experiment.

Item considered.	Meal Mixture Fed.				
	Preliminary Oats 100, Bran 100.	Oats 100, Bran 100.	Oats 100, Bran 100, Oil meal 100.	Oats 100, Bran 100, Gluten 100.	Oats 100, Bran 100, Cotton seed meal 100.
Period.	Feb. 21 to Mar. 6.	Mar. 7 to Mar. 20.	Mar. 21 to April 3.	April 4 to April 17.	April 18 to May 2.
Number of days on feed..............	14	14	14	14	14
Amount meal mixture consumed in period......	364 lbs.	364 lbs.	364 lbs	364 lbs.	364 lbs.
Average amount meal per cow per day .	$6\frac{1}{2}$ "	$6\frac{1}{2}$ "	$6\frac{1}{2}$ "	$6\frac{1}{2}$ "	$6\frac{1}{2}$ "
Amount roots and ensilage consumed by group in period....................	2660 "	2380 "	2359 "	2338 "	1820 "
Average amount roots and ensilage per cow per day....	47·5 "	43 "	42 "	41·5 "	$32\frac{1}{2}$ "
Amount hay consumed by group in period................	168 "	168 "	168 "	168 "	168 "
Total milk in average day of period....	86 "	82 "	76·5 "	82 "	86 "
Total milk produced by group in period	$1210\frac{1}{2}$ "	1147 "	1145 "	$1148\frac{1}{2}$ "	$1117\frac{1}{2}$ "
Total milk produced by group in first three days of period....	258·5 "	250 "	$243\frac{1}{2}$ "	241 "	247 "
Total milk produced by group in last three days of period...	255 "	244 "	241 "	242 "	241 "
Value of food consumed by group during period.............	$6 89	$6 61	$7 21	$6 86	$6 71
Value of food consumed by group in one day	0 $49\frac{3}{14}$	0 $47\frac{3}{14}$	0 $51\frac{1}{2}$	0 49	0 $47\frac{13}{14}$
Cost of 100 lbs. milk produced by group during period.	0 57	0 57·6	0 63	0 60	0 60
Cost of 100 lbs. milk produced by group during first three days of period......	0 56·3	0 56·7	0 63	0 60	0 58·2
Cost of 100 lbs. milk produced by group during last three days of period.. ..	0 57·9	0 58·1	0 64	0 60	0 59·7
Normal rate of decrease in milk flow during period....................	4 p.c.	4 p.c.	4 p.c.	4 p.c.	4 p.c.
Rate of decrease—; or increase+; during period.......	—1·3 p.c.	—2·3 p.c.	—1 p.c.	+·4 p.c.	—2·4 p.c.
Average per cent of fat in milk during period............................	4·4 p.c.	4·6 p.c.	4·6 p.c.	4·4 p.c.	4·4 p.c.

GROUP II.—Bran, Oats, Gluten, Oil Meal and Cotton Seed Meal Experiment.

ITEM CONSIDERED.	MEAL MIXTURE FED.				
	Preliminary Bran 100, Oats 100.	Oats 100, Bran 100, Oil meal 100.	Oats 100, Bran 100, Gluten 100.	Oats 100, Bran 100, Cotton seed meal 100.	Bran 100, Oats 100.
Period.	Feb. 21 to Mar. 6.	Mar. 17 to Mar. 20.	Mar. 21 to April 3.	April 4 to April 17.	April 18 to May 2.
Number of days on feed..............	14	14	14	14	14
Amount meal mixture consumed in period	308 lbs.	308 lbs.	308 lbs.	308 lbs.	308 lbs.
Average amount meal per cow per day..	$5\frac{1}{2}$ "	$5\frac{1}{2}$ "	$5\frac{1}{2}$ "	$5\frac{1}{2}$ "	$5\frac{1}{2}$ "
Amount roots and ensilage consumed by group in period..................	2660 "	2520 "	2506 "	2492 "	1960 "
Average amount roots and ensilage per cow per day	47·5 "	45 "	$44\frac{3}{11}$ "	$44\frac{1}{2}$ "	35 "
Amount hay consumed by group in period..................	168 "	168 "	168 "	168 "	168 "
Total milk in average day of period...	72 "	70 "	72 "	71 "	67·6 "
Total milk produced by group in period	1003 "	$986\frac{1}{2}$ "	$1005\frac{1}{2}$ "	$988\frac{1}{2}$ "	947·5 "
Total milk produced by group in first three days of period..............	215·5 "	$209\frac{1}{2}$ "	$216\frac{1}{2}$ "	214 "	211 "
Total milk produced by group in last three days of period..............	$210\frac{1}{2}$ "	$212\frac{1}{2}$ "	$217\frac{1}{2}$ "	$212\frac{1}{2}$ "	197 "
Value of food consumed by group during period	$6 33	$6 71	$6 43	$6 71	$5 63
Value of food consumed by group in one day..................	0 $45\frac{3}{14}$	0 $47\frac{13}{14}$	0 $45\frac{13}{14}$	0 $47\frac{13}{14}$	0 $40\frac{3}{14}$
Cost of 100 lbs. milk produced by group during period..................	0 63	0 68	0 64	0 67·8	0 59·4
Cost of 100 lbs. milk produced by group during first three days of period......	0 63	0 68·2	0 64	0 67·3	0 57·2
Cost of 100 lbs. milk produced by group during last three days of period......	0 64·4	0 67·3	0 64	0 67·9	0 61·2
Normal rate of decrease in milk-flow during period..................	4 p.c.	4 p.c.	4 p.c.	4 p.c.	4 p.c.
Rate of decrease—; or increase +; during period..................	—2 p.c.	+1·5 p.c.	+ ·4 p.c.	— ·7 p.c.	—6·6 p.c.
Average per cent of fat in milk during period..................	4·2 p.c.	4·7 p.c.	4·7 p.c.	4·7 p.c.	4·5 p.c.

GROUP III.—Bran, Oats, Gluten, Oil Meal and Cotton Feed Meal Experiment.

ITEM CONSIDERED.	MEAL MIXTURE FED.				
	Preliminary, Bran 100, Oats 100.	Oats 100, Bran 100, Gluten 100.	Oats 100, Bran 100, Cotton seed meal 100.	Oats 100, Bran 100.	Oats 100, Bran 100, Oil meal 100.
Period.	Feb. 21 to Mar. 6.	Mar. 17 to Mar. 20.	Mar. 21 to Apl. 3.	Apl. 4 to Apl. 17.	Apl. 18 to May 2.
Number of days on feed	14	14	14	14	14
Amount meal mixture consumed in period	308 lbs.	308 lbs.	308 lbs.	308 lbs.	308 lbs.
Average amount meal per cow per day	5½ "	5½ "	5½ "	5½ "	5½ "
Amount roots and ensilage consumed by group in period	2,590 "	2,380 "	2,359 "	2,338 "	1,820 "
Average amount roots and ensilage per cow per day	46¼ "	42½ "	42 "	42 "	32½ "
Amount hay consumed by group in period	168 "	168 "	168 "	168 "	168 "
Total milk in average day of period	76 "	77 "	76 "	71 "	66 "
Total milk produced by group in period	1,063½ "	1,077½ "	1,061½ "	977 "	932 "
Total milk produced by group in first three days of period	228 "	223 "	230 "	217½ "	207½ "
Total milk produced by group in last three days of period	228½ "	233 "	224½ "	206½ "	199 "
Value of food consumed by group during period	$6 26	$6 30	$6 58	$6 01	$6 01
Value of food consumed by group in one day	0 $44\frac{10}{14}$	0 45	0 47	0 $42\frac{13}{14}$	0 $42\frac{13}{14}$
Cost of 100 lbs. milk produced by group during period	0 59	0 58·5	0 62	0 61·5	0 64·5
Cost of 100 lbs. milk produced by group during first three days of period	0 59	0 60·5	0 61	0 59·3	0 62 3
Cost of 100 lbs. milk produced by group during last three days of period	0 59	0 58	0 63	0 62·4	0 64·8
Normal rate of decrease in milk flow during period	4 p.c.	4 p.c.	4 p.c.	4 p.c.	4 p.c.
Rate of decrease —; or increase +; during period	—	+4·4 p.c.	—2·6 p.c.	—5 p.c.	—4 p.c.
Average per cent of fat in milk during period	4·2 p.c.	4·7 p.c.	4·9 p.c.	4·5 p.c.	4·2 p.c.

Group IV.—Bran, Oats, Gluten, Oil Meal and Cotton Seed Meal Experiment.

Item Considered.	Meal Mixture Fed.				
	Preliminary, Bran 100, Oats 100.	Bran 100, Oats 100, Cotton seed meal 100.	Bran 100, Oats 100.	Bran 100, Oats 100, Oil meal 100.	Bran 100, Oats 100, Gluten 100.
Period.	Feb. 21 to Mar. 6.	Mar. 17, to Mar. 20.	Mar. 21 to Apl. 3.	Apl. 4 to Apl. 17.	Apl. 18 to May 2.
Number of days on feed	14	14	14	14	14
Amount meal mixture consumed in period..............................	392 lbs.	392 lbs.	392 lbs.	392 lbs.	392 lbs.
Average amount meal per cow per day..	7 ″	7 ″	7 ″	7 ″	7 ″
Amount roots and ensilage consumed by group in period.....................	2,660 ″	2,660 ″	2,590 ″	2,520 ″	2,030 ″
Average amount roots and ensilage per cow per day	47½ ″	47½ ″	46¼ ″	45 ″	36¼ ″
Amount hay consumed by group in period..............................	168 ″	168 ″	168 ″	168 ″	168 ″
Total milk in average day of period ...	87½ ″	88 ″	83 ″	83 ″	82
Total milk produced by group in period.	1,225½ ″	1,233 ″	1,166 ″	1,167½ ″	1,149 ″
Total milk produced by group in first three days of period	266 ″	257 ″	259 ″	246½ ″	250 ″
Total milk produced by group in last three days of period	264½ ″	267½ ″	246½ ″	254 ″	252 ″
Value of food consumed by group during period.............................	$7 17	$7 88	$7 10	$7 70	$6 85
Value of food consumed by group in one day	0 $51\frac{3}{14}$	0 $56\frac{4}{14}$	0 $50\frac{10}{14}$	0 55	$48\frac{13}{14}$
Cost of 100 lbs. milk produced by group during period	0 59	0 64	0 61	0 66	0 59·6
Cost of 100 lbs. milk produced by group during first three days of period......	0 60	0 66	0 59	0 67	0 58·7
Cost of 100 lbs. milk produced by group during last three days of period	0 59	0 63	0 61·5	0 65	0 58·2
Normal rate of decrease in milk flow during period........................	4 p.c.	4 p.c.	4 p.c.	4 p.c.	4 p.c.
Rate of decrease —; or increase +; during period	—1 p.c.	+2·5 p.c.	—5 p.c.	+3·2 p.c.	+·8 p.c.
Average per cent of fat in milk during period	4·3 p.c.	4·4 p.c.	4·4 p.c.	4·8 p.c.	4·4 p.c.

SUMMARY of Bran, Oats, Gluten, Oil Meal and Cotton Seed Meal Experiment.

Item Considered.	Meal Mixture Fed.				
	Preliminary, Oats 100, Bran 100.	Oats 100, Bran 100.	Oats 100, Bran 100, Oil meal 100.	Oats 100, Bran 100, Gluten 100.	Oats 100, Bran 100, Cotton seed meal 100.
Period.	—	—	—	—	—
Number of days on feed	14	14	14	14	14
Amount meal mixture consumed in period	1,372 lbs.	1,372 lbs.	1,372 lbs.	1,372 lbs.	1,372 lbs.
Average amount meal per cow per day.	6·1 "	6·1 "	6·1 "	6·1 "	6·1 "
Amount roots and ensilage consumed by group in period	10,570 "	9,268 "	9,219 "	9,254 "	9,331 "
Average amount roots and ensilage per cow per day	47·2 "	41·5 "	41 "	41·1 "	41·6 "
Amount hay consumed by group in period	672 "	672 "	672 "	672 "	672 "
Total milk in average day of period	320·5 "	303·6 "	295·5 "	313 "	321 "
Total milk produced by group in period.	4,502·5 "	4,237·5 "	4,231·5 "	4,380·5 "	4,400·5 "
Total milk produced by group in first three days of period.	998 "	937·5 "	907 "	940·5 "	948 "
Total milk produced by group in last three days of period	958·5 "	893 "	906·5 "	944·5 "	945·5 "
Value of food consumed by group during period	$ 26 65	$ 25 35	$ 27 63	$ 26 44	$ 27 88
Value of food consumed by group in one day	1 90·4	1 81·1	1 96·6	1 48·8	1 99·1
Cost of 100 lbs. milk produced by group during period	0 59·1	0 59·8	0 65·3	0 60·3	0 63·3
Normal rate of decrease in milk flow during period	4 p.c.	4 p.c.	4 p.c.	4 p.c.	4 p.c.
Rate of decrease —; or increase +; during period	—3·1 p.c.	—3·7 p.c.	—	+·4 p.c.	—·2 p.c.
Average per cent of fat in milk during period	4·3 p.c.	4·5 p.c.	4·6 p.c.	4·5 p.c.	4·6 p.c.

INTERNATIONAL STOCK FOOD FOR DAIRY COWS.

At the instance of the International Stock Food manufacturers, an experiment to get some information as to the value of Stock Food as an addition to the ration of dairy cows in milk was instituted.

The report which follows does not seem to indicate that it has much value as a food for this class of stock.

In the valuation put on the food when Stock Food was fed no account is taken of the cost of the Stock Food.

INTERNATIONAL Stock Food for Dairy Cows.

—	METHOD OF FEEDING.							
	1st period of 1 week.		2nd period of 3 weeks.		3rd period of 3 weeks.		—	
	Group A.	Group B.	Group A.	Group B.	Group A.	Group B.	Summary.	Summary.
	Preliminary.	Preliminary.	No stock food.	Fed stock food.	Fed stock food.	No stock food.	Fed stock food.	Fed no stock food.
	Number in group 3.	Number in group 3.	Number in group 3.	Number in group 3.	Number in group 3.	Number in group 3.	Number in group 3.	Number in group 3.
Meal fed group in 1 day ..... Lbs.	21	17·5	22	17·5	20	18	.....	.....
Hay fed group in 1 day ..... "	4	4	4	4	4	4	.....	.....
Ensilage and roots fed group in 1 day ..... "	202	181	.....	.....	.....	.....	.....	.....
Ensilage fed group in 1 day ..... "	.....	.....	160	190	165	150	355	310
Stock food fed group in 1 day ..... Ozs.	.....	.....	.....	3	3	.....	6	.....
Meal fed group in period ..... Lbs.	147	122·5	435	374·5	392	371	766·6	806
Hay fed group in period ..... "	28	28	84	84	84	77	168	161
Ensilage and roots fed group in period ..... "	1,414	1,267	.....	.....	.....	.....	.....	.....
Ensilage fed group in period ..... "	.....	.....	3,570	3,605	3,430	3,150	7,035	6,720
Stock food fed group in period ..... "	.....	.....	.....	3 9	3·9	.....	7·8	.....
Value of feed fed group in period ..... $	2 97	2 57	8 41	7 65	7 64	7 12	15 29	15 53
Value of feed fed 1 cow in 1 day ..... Cts.	14	12·2	13·3	12·1	12·1	11·3	12·1	12·3
Milk produced by group in period ..... Lbs.	429	406·5	1,173·5	1,134	932	973·5	2,066	2,147
First day's milk from group ..... "	63½	59·5	61·5	58	51·5	54·5	109·5	116
Second " " ..... "	61	55	61	56·5	50·5	53·5	107	114·5
Average daily yield of group during 1st week ..... "	61·3	58	58·2	55.2	49·2	50·6	104·4	108·8
" " 2nd " ..... "	.....	.....	53	52·8	40·2	43·3	93	96·3
" " 3 weeks ..... "	.....	.....	53·5	54	44·3	46·3	98·3	99·8
Next to last day's milk from group ..... "	61·5	59·5	53·5	54·5	40	46	94·5	99·8
Last day's milk from group ..... "	61	59	52	52·5	40	42	92·5	94
Cost to produce 100 lbs. milk during period ..... Cts.	69·2	63·2	71·7	67·4	81·9	73·1	74	72·3

ROOTS VS. ENSILAGE FOR DAIRY COWS.

In January and February an experiment was undertaken with dairy cows to get some idea as to whether the addition of a certain proportion of roots to the ensilage ration fed would in any way influence the yield of milk.

The roots were mixed with the ensilage in the proportion of 100 pounds roots to 200 pounds corn ensilage. In each case the cows were given all they would eat of the succulent part of the ration.

They were at the same time fed as much meal as the milk flow warranted, that is about 1 pound meal to 3 pounds milk produced.

The results do not seem to show up very strongly in favour of roots.

No conclusions are to be drawn, however, just at present as it is proposed to try the experiment on a more comprehensive scale at a later date.

EXPERIMENT to compare Roots with Ensilage.

Item Considered.	Ration Fed.		
	Preliminary Period.	1st Period, no Roots.	2nd Period, Roots.
Period.	Dec. 25 to Jan. 1, 1907.	Jan. 2 to Jan. 22.	Jan. 23 to Feby. 13.
Number of days on feed........	7	21	21
Amount meal mixture consumed in period............ Lbs.	658	2,016	1,890
Average amount meal per cow per day .... "	5·5	5·6	5·29
Amount ensilage consumed by group in period.... .... "	....	16,800	....
Amount roots and ensilage consumed by group in period "	6,070	....	20,040
Average amount ot ensilage per cow per day........... "	.. ..	47·	....
Average amount of roots and ensilage per cow per day. "	51·0	.. ..	56·1
Total milk in average day of period.................... "	221·9	267·8	235·6
Total milk produced by group in period................ "	1,553·5	5,624·5	4,949
" " " in 1st 3 days of period.. "	655·5	752	773·5
" " " in last 3 " " . "	684·5	800	680
Value of food consumed by group during period........ $	13 80	40 65	42 69
" " " in 1 day............. $	1 97	1 93·5	2 03
Cost of 100 lbs. milk produced by group during period..Cts.	88·8	70·5	86·2
" 100 " " " " 1st 3 days. "	90·2	77·1	78·7
" 100 " " " " last 3 days "	86·3	72·5	89·6
Normal rate of decrease in milk-flow during period.....Lbs.	2·5%	7·5%	7·5%
Rate of decrease; or increase; during period...... . "	....	+6·3%	-12%

BEEF PRODUCTION.

SOME REMARKS.

No line of farming affords more genuine pleasure to its devotees than does beef production. There is a feeling of satisfaction and pleasure in watching a good hearty steer make way with his food and lay on flesh that scarce any other feature in farming can approach. Nor need the farmer be satisfied with the pleasure alone, for where skill and judgment are exercised good profits are practically sure to follow.

The profits likely to accrue to him who feeds steers wisely and well are of two kinds. In the first place having bought good steers at a reasonable price he is likely to be able to sell them at such an advance on cost when fat as not only to recoup his outlay for both stockers and feed, but to leave a good margin of profit. To put it in another way, he is likely to be able to sell a steer that has cost him to start with say, $40, and that has cost for feed $20 more during the feeding period, not for $60 which would recoup him, but for $70 or possibly for even $80, leaving him a profit of from $10 to $20 on his outlay of money and feed. Such margins of profit do not always materialize, but one other advantage the farmer is certain to reap. Since a large amount of food passes through the steer in the fatting process and since the increase in live weight is relatively small and of a character to remove very little material of any fertilizing value from this food it is all available for use on the land, and in addition a large amount of humus forming material of the very best kind is at the farmer's disposal. Farms where beef has been produced for years and the manure utilized are invariably productive. In addition it must be remembered that the farmer by feeding beef makes for himself a home market for all the forage of every description that he can raise on the farm, so even did he find himself at the end of the year with scarcely more than market prices or even less for feed given his steers he might still console himself with the fact that it had practically all gone back on his land and he would be sure to reap the advantage later.

FEEDING STEERS.

The methods followed in feeding steers have a great deal to do with the success of the operations. The feeds used are of course also of very great importance.

The economical results obtained here are, we consider, due to the system followed. Briefly outlined, that system is as follows:—

For from two to four weeks steers receive no meal in addition to the roughage ration. The roughage ration fed is of a laxative character, viz.: roots, ensilage and clover hay. Roots usually constitute the major part of the succulent portion of the ration at this time, the first 3 or 4 weeks after stabling.

At the end of from two to four weeks meal is fed. The quantity given at first is very small, about 1 pound per steer per day.

This is gradually increased till, if the feeding period last say six months, the steers are usually receiving from 10 to 11 pounds per day during the last 10 days or fortnight.

The meal fed always contains a considerable proportion of bran. In 1905-6 oil meal and bran were fed. In 1906-7 gluten meal and bran made up the meal ration. The proportion was gluten 400 to bran 100.

The roughage ration was prepared as follows:—300 pounds ensilage was spread on the feed floor, over this was spread 100 pounds roots with about 40 pounds cut hay or straw. This was repeated layer after layer until enough for two days was corded up ready to feed.

The meal is scattered on the roughage in the trough after it is before the cattle. The hay is fed when the succulent portion of the feed with the meal mixed therein, has been practically all eaten.

The cattle are fed in this way night and morning, no portion being fed at noon.

SCOPE OF REPORT.

On account of the change in the date of beginning the fiscal year, it is necessary in this report to summarize the work of two seasons so far as beef production is concerned. The report on this line of work is accordingly divided into two parts, viz.:—Experiments in 1905-6, and experiments in 1906-7.

EXPERIMENTS IN 1905-6.

WINTER FEEDING.

The lines of experiment followed in the winter of 1905-6 were as follows:—

A. A study of the feeding qualities of well bred as compared with fairly well bred and poorly bred steers. This might be expressed differently, thus:—Had the farmer better feed, superior, good or inferior cattle so far as profits are concerned?

B. A study of baby beef production.
C. Cost of beef from birth to block at various ages.
D. A study of the production of stall fed beef in summer.

'A.'

In the autumn of 1905 three groups of steers differing markedly as to quality were selected in this district. Group 1, consisted of 9 steers weighing 1,263 pounds each and of excellent breeding and conformation. These cost delivered, 4 cents per pound.

Group 2, consisted of 8 steers weighing 1,111 pounds each of good breeding and very fair conformation. These cost delivered, 3½ cents per pound.

Group 3, consisted of 8 steers weighing 1,037 pounds each of mongrel breeding and poor conformation from the beef producer's standpoint. These cost delivered, 3 cents per pound.

Lot 1.

Number of steers in lot	9	
First weight, gross, Dec. 11, 1905	11,370	lbs.
First weight, average	1,263	"
Finished weight, gross, April 6, 1906	13,480	"
Finished weight, average	1,497½	"
Total gain in 116 days	2,110	"
Average gain per steer	234	"
Daily gain per steer	2·02	"
Daily gain for lot, 9 steers	18·18	"
Gross cost of feed	$ 161 25	
Cost of 100 pounds gain	7 64	
Cost of steers, 11,370 pounds at $4 per 100 pounds	454 80	
Total cost to produce beef, $454·80 + $160·25	616 05	
Sold, 13,480 at $5.25 per 100 pounds, less 4 per cent	679 39	
Profit or loss—profit	63 34	
Net profit per steer	7 04	
Average buying price per steer	50 53	
Average selling price per steer	75 49	
Average increase in value	24 96	
Average cost of feed for steer	17 92	
Amount of meal eaten by lot of 9 steers	6,670¼	lbs.
Amount of ensilage and roots	66,776	"
Amount of hay	5,022	"

Lot 2.

Number of steers in lot	8	
First weight, gross, Dec. 11, 1905	8,890	lbs.
First weight, average	1,111	"
Finished weight, gross, April 6, 1906	10,985	"
Finished weight, average	1,373	"
Total gain in 116 days	2,095	"
Average gain per steer	262	"
Daily gain per steer	226	"
Daily gain for lot, 8 steers	18·08	"
Gross cost of feed	$ 140 73	
Cost of 100 pounds gain	6 72	
Cost of steers, 8,890 pounds at $3 50 per 100 pounds	311 15	
Total cost to produce beef, $311·15 + $140·73	541 88	

Sold 10,985 lbs. at $5 25 per 100 lbs., less 4 per cent..	$ 553 66	
Profit or loss—profit..	101 78	
Net profit per steer..	12 72	
Average buying price per steer..	38 89	
Average selling price per steer..	69 21	
Average increase in value..	30 32	
Average cost of feed for steer..	17 60	
Amount of meal eaten by lot of 8 steers..	5,936	lbs.
Amount of ensilage and roots..	57,048	"
Amount of hay..	4,408	"

Lot 3.

Number of steers in lot..	8	
First weight, gross..	8,300	lbs.
First weight average..	1,037	"
Finished weight, gross..	9,990	"
Finished weight average..	1,248	"
Total gain in 116 days..	1,690	"
Average gain per steer..	211	"
Daily gain per steer..	1·82	"
Daily gain for lot, 8 steers..	14·56	"
Gross cost of feed..	$ 145 40	
Cost of 100 lbs. gain..	8 60	
Cost of steers, 8,300 lbs. at $3 per 100 lbs..	249 00	
Total cost to produce beef, $249 + $145·40..	394 40	
Sold, 9,990 lbs. at $4 50 per 100 lbs., less 4 per cent..	431 59	
Profit or loss—profit..	37 12	
Net profit per steer..	4 65	
Average buying price per steer..	31 13	
Average selling price per steer..	53 95	
Average increase in value..	22 82	
Average cost of feed for steer..	18 18	
Amount of meal eaten by lot of 8 steers..	6,326	lbs.
Amount of ensilage and roots..	57,048	"
Amount of hay..	4,464	"

'D.'

SPRING FEEDING.

In the spring of 1906 two groups of steers were purchased to experiment with as to possibility of profitably producing beef in the stable to compete in the open market with grass fed beef.

Lot 1, consisted of 10 steers weighing 1,080 lbs. each and cost us 4 cents per lb. delivered.

Lot 2, consisted of steers weighing 883 lbs. each and cost us 3½ cents per lb. delivered.

Lot 1.

Number of steers in lot..	10	
First weight, gross, April 21, 1906..	10,800	lbs.
First weight, average..	1,080	"
Finished weight, gross, July 23, 1906..	12,825	"
Finished weight average..	1,282	"
Total gain in 92 days..	2,025	"
Average gain per steer..	203	"

Daily gain per steer	2·21	
Daily gain for lot, 10 steers	22·10	
Gross cost of feed	$ 128 93	
Cost of 100 lbs. gain	6 37	
Cost of steers, 10,800 lbs. at $4 per 100 lbs.	432 00	
Total cost to produce beef, $432 + $128 93	560 93	
Sold, 12,825 at $5 25 per 100 lbs., less 4 per cent	673 31	
Profit or less—profit	112 38	
Net profit per steer	11 24	
Average buying price per steer	43 20	
Average selling price per steer	67 33	
Average increase in value	24 13	
Average cost of feed for steer	12 89	
Amount of meal eaten by lot of 10 steers	6,410	lbs.
Amount of ensilage and roots	43,725	“
Amount of hay	3,280	“

Lot 2.

Number of steers in lot	10	
First weight, gross, April 7, 1906	8,830	lbs.
First weight, average	883	“
Finished weight, gross, August 2, 1906	11,710	“
Finished weight, average	1,171	“
Total gain in 116 days	2,880	“
Average gain per steer	288	“
Daily gain per steer	2·46	“
Daily gain for lot, 10 steers	24·60	
Gross cost of feed	$ 129 19	
Cost of 100 lbs. gain	4 52	
Cost of steers, 8,830 lbs. at $3 50 per 100 lbs.	309 05	
Total cost to produce beef, $309 05 + $129 19	438 24	
Sold, 11,710 at $4.50 per 100 lbs., less 4 per cent	505 87	
Profit or loss—profit	67 63	
Net profit per steer	6 76	
Average buying price per steer	30 91	
Average selling price per steer	50 59	
Average increase in value	19 68	
Average cost of feed for steer	12 92	
Amount of meal eaten by lot of 10 steers	4,940	lbs.
Amount of ensilage and roots	58,275	“
Amount of hay	4,030	“

‘B.’

BABY BEEF.

During the winter of 1905-6 the 2 lots of limited and unlimited ration steers dropped in 1905, were continued on the regular rations. In the spring of 1906, however, it was decided to vary the experiment and the lot of limited ration steers (lot 1) were put on a heavier grain ration, and fed till July 23, 1906, when they were sold for beef.

LOT 1.—LIMITED GROWING RATION, DROPPED 1905.

Number of steers in lot	5	
First weight, gross	1,800	lbs.
First weight, average	360	“

Finished weight, gross, July 23, 1906	3,735	lbs.
Finished weight, average	747	"
Total gain in 234 days	1,935	"
Average gain per steer	387	"
Daily gain per steer	1·65	"
Daily gain for lot, 5 steers	8·27	"
Gross cost of feed	$ 93 94	
Cost of 100 lbs. gain	4 85	
Value of steers, Dec. 1, 1905, 1,800 lbs. at $3 50 per 100 lbs.	63 00	
Total cost to produce beef $63 + $93·94	156 94	
Sold, 3,735 lbs. at $5 per 100 lbs., less 4 per cent.	179 30	
Profit.	22 36	
Net profit per steer	4 47	
Average valuation per steer, Dec. 1, 1905	12 60	
Average selling price per steer, July 23, 1906	35 86	
Average increase in value	23 26	
Average cost of feed for steer	18 79	
Amount of meal eaten by lot of 5 steers in 234 days	4,751·5	lbs.
Amount of ensilage and roots	34,875	"
Amount of hay	3,410	"

The meal consisted of 1,157½ lbs. oats, 280 lbs. corn, 115 lbs. oil meal, 580 lbs. barley, 1,831½ lbs. bran and 787½ lbs. gluten meal. The mixture of ensilage and roots was made up of 12,725 lbs. roots and 22,150 lbs. corn ensilage. Each steer consumed in the 234 days, 231½ lbs. oats, 56 lbs. corn, 23 lbs. oil meal, 116 lbs. barley, 366 lbs. bran, 157½ lbs. gluten meal, 682 lbs. hay, 2,545 lbs. roots and 4,430 lbs. ensilage.

To produce 1 lb. increase in live weight required 2·24 lbs. meal, 1·7 lbs. hay and 18 lbs. ensilage and roots.

LOT 2.—FULL FATTENING RATION, DROPPED 1905.

Number of steers in lot	5	
First weight, gross	2,345	lbs.
First weight, average	469	"
Finished weight, gross, July 2, 1906	4,585	"
Finished weight, average	917	"
Total gain in 213 days	2,240	"
Average gain per steer	448	"
Daily gain per steer	2·1	"
Daily gain for lot, 5 steers	10·5	"
Gross cost of feed	$ 92 89	
Cost of 100 lbs. gain	4 14	
Value of steers, Dec. 1, 1905, 2,345 lbs. at $3 50 per 100 lbs.	82 08	
Total cost to produce beef, $82 08 + $92 89	174 97	
Sold, 4,585 lbs. at $5 25 per 100 lbs., less 4 per cent.	231 10	
Profit on lot	56 13	
Net profit per steer	11 22	
Average valuation per steer, Dec. 1, 1905	16 42	
Average selling price per steer, July 2, 1906	46 22	
Average increase in value	29 80	
Average cost of feed for steer	18 58	
Amount of meal eaten by lot of 5 steers in 213 days	4,646	lbs.
Amount of ensilage and roots	35,425	"
Amount of hay	3,420	

The meal consumed consisted of 1,140 lbs. oats, 287 lbs. corn, 300 lbs. barley, 2,069 lbs. bran, 10 lbs. oil meal, and 840 lbs. gluten meal. The mixture of ensilage and roots was made up of 14,200 lbs. roots and 21,225 lbs. corn ensilage. Each steer consumed in the 213 days, 228 lbs. oats, 51½ lbs. corn, 60 lbs. barley, 414 lbs. bran, 2 lbs. oil meal, 168 lbs. gluten meal, 684 lbs. hay, 2,840 lbs. roots and 4,245 lbs. corn ensilage.

To produce 1 lb. increase in live weight required ·207 lbs. meal, 1·52 lbs. hay and 15·8 lbs. roots and ensilage.

'C.'

Interesting summaries follow showing the history of the two lots of calves dropped in 1905, and one lot dropped in 1904. These were all sold in 1906. Lot 2 being 14 months old, Lot 1 about 15 months old and Lot 3, 24 months old.

LOT 1.—LIMITED GROWING RATION, DROPPED 1905.

Life History.

Number of steers in lot	5	
First weight, gross, May 12, 1905	490	lbs.
First weight, average	98	"
Finished weight, gross, July 23, 1906	3,735	"
Finished weight average	747	"
Total gain in 435 days	3,245	"
Average gain per steer	649	"
Daily gain per steer	1·49	"
Daily gain for lot, 5 steers	7·46	"
Gross cost of feed	$ 140 91	
Cost of 100 lbs. gain	4 34	
Cost of steers, $5 each	25 00	
Total cost to produce beef, $140 91 + $25	165 91	
Sold, 3,735 lbs. at $5 per 100 lbs., less 4 per cent	179 30	
Profit on lot	13 39	
Net profit per steer	2 68	
Average buying price per steer	5 00	
Average selling price per steer, July 23, 1906	35 86	
Average increase in value	30 86	
Average cost of feed for steer	28 18	
Amount of meal eaten by lot of 5 steers in 435 days	6,801·5	lbs.
Amount of ensilage and roots	40,595	"
Amount of hay	4,992	"
Amount skim milk	10,825	"

The meal consumed consisted of 1,890½ lbs. oats, 2,378½ lbs. bran, 808 lbs. barley, 969½ lbs. gluten meal, 115 lbs. oil meal and 280 lbs. corn.

LOT 2.—FULL FATTENING RATION, DROPPED 1905.

Life History.

Number of steers in lot	5	
First weight, gross, May 12, 1905	795	lbs.
First weight, average	159	"
Finished weight, gross, July 2, 1906	4,585	"
Finished weight, average	917	"
Total gain in 414 days	3,790	"

Average gain per steer	758	lbs.
Daily gain per steer	1·83	"
Daily gain for lot, 5 steers	9·15	"
Gross cost of feed	$ 145 59	
Cost of 100 lbs. gain	3 84	
Cost of steers, $5 each	25 00	
Total cost to produce beef, $145 59 + $25	170 59	
Sold, 4,585 at $5 25 per 100 lbs., less 4 per cent	231 10	
Profit on lot	60 51	
Net profit per steer	12 10	
Average buying price per steer, May 12, 1905	5 00	
Average selling price per steer, July 2, 1906	46 22	
Average increase in value	41 22	
Average cost of feed for steer	29 20	
Amount of meal eaten by lot of 5 steers	6,856	lbs.
Amount of ensilage and roots	42,215	"
Amount of hay	5,475	"
Amount of skim milk	11,350	"

Meal consumed consisted of 1,980¾ lbs. oats, 3,029 lbs. bran, 475 lbs. barley, 287 lbs. corn, 10 lbs. oil meal, 840 lbs. gluten meal and 235 lbs. mixed meal.

A LIFE HISTORY.

The next lot, dropped in 1904, were fed as usual with a very light meal ration till May 18, 1905, when they were turned out to pasture and left thereon till October 28, 1905. The pasture was poor, however, and heavily stocked, so the steers did very little more than hold their own.

Below follows a life history.

LOT 3.—LIMITED RATION, CALVES DROPPED 1904.

Number of steers in lot	6	
First weight, gross, May 1, 1904	490	lbs.
First weight, average	81	"
Finished weight, gross, May 7, 1906	6,995	"
Finished weight, average	1,166	"
Total gain in 743 days	6,505	"
Average gain per steer	1,084	"
Daily gain per steer	1·46	"
Daily gain per lot, 6 steers	8·76	"
Gross cost of feed	$ 264 07	
Cost of 100 lbs. gain	4 06	
Cost of steers, $5 each, 6 steers	30 00	
Total cost to produce beef $264 07 + $30	294 07	
Sold, 6,995 lbs. at $5 25 per 100 lbs., less 5 per cent	348 86	
Profit on lot	54 79	
Net profit per steer	9 13	
Average buying price per steer	5 00	
Average selling price per steer	58 14	
Average increase in value	53 14	
Average cost of feed for steer	44 01	
Amount of meal eaten by lot of 6 steers	8,621	lbs.
Amount of ensilage and roots	78,438	"
Amount of hay	7,542	"

Amount of straw eaten	1,684 lbs.
Amount of skim milk	15,738 "
Amount of green feed, clover, mixed peas and oats cut green, rape, &c	7,266 "
Pasture 5 months, for lot	30 months.

The meal consisted of 1,247 lbs. oats, 504 lbs. oil meal, 273 lbs. barley, 3,006 lbs. bran, 1,648 lbs. gluten meal and 1,943 lbs. corn. The hay was red clover hay in every case.

The green feed, 7,266 lbs., was made up of green red clover 500 lbs., rape 1,256 lbs. and mixed crop (oats 3 bushels and peas 1 bushel seed per acre) 5,510 lbs.

The straw fed was chaffed and mixed with ensilage and roots. Oat straw was used.

BEEF PRODUCTION, 1906-07.

The work with beef cattle in the winter of 1906-07 was, on account of lack of space, rather limited. Steers in this district in the month of November were very low in flesh on account of a very dry season. The experiments were, however, highly interesting, since they ran very smoothly, the cattle being remarkably healthy and doing exceedingly well, no untoward incident of any kind happening to detract in any way from the value of the results. From a financial standpoint, the work was probably as satisfactory as any feeding operations that have ever been conducted here, considering the high prices that have maintained for stockers and foods, and later the low prices for the finished product.

The feeds used were perhaps the best that have ever been fed here. The corn ensilage was exceedingly rich in dry matter of a highly nutritious character, since the corn was well eared and well matured when cut. The ears were of a good size and glazed, before cutting. The hay fed was clean timothy, and the meal, a mixture of four parts gluten meal with one part bran, has proven with us to be one of the most satisfactory feeds for beef production.

The work has been along the following lines:—

A. Feeding superior steers in comparison with inferior steers.
B. Feeding short keep steers in comparison with long keep steers.
C. Baby beef experiments continued.

A.

In November, 1906, two groups of steers were selected in this neighbourhood. They were all low in flesh, due to scarcity of grass.

Lot 1, consisted of 7 steers weighing 1,095 lbs. each. They were Shorthorn grades being of good conformation and quality. All 2-year-olds. Cost 4 cents per lb. delivered.

Lot 2, consisted of 7 steers weighing 851 lbs. each. They were showing various faults in conformation and breeding. Ayrshire, Holstein, Jersey and Guernsey blood was in evidence here and there and in one or two cases no conclusion could be reached as to the blood lines indicated, pure scrub probably. Cost 3 cents per lb. delivered.

A study of the subjoined feed histories will prove interesting.

LOT I.—EXTRA CHOICE.

Number of steers in lot	7
First weight, gross, Nov. 14, 1906	7,675 lbs.
First weight, average	1,095 "
Finished weight, gross, May 13, 1907	10,645 "
Finished weight, average	1,521 "
Total gain in 180 days	2,970 "

Average gain per steer	424	lbs.
Daily gain per steer	2·36	"
Daily gain for lot, 7 steers	16·52	"
Gross cost of feed	$ 146 66	
Cost of 100 lbs. gain	4 26	
Cost of steers, 7,675 lbs. at $4 per 100 lbs.	307 00	
Total cost to produce beef, $307 + 146.66	543 66	
Sold, 10,645 lbs. at $5 75 per 100 lbs., less 5 per cent.	581 49	
Profit on lot	127 83	
Net profit per steer	18 23	
Average buying price per steer, Nov. 14, 1906	43 86	
Average selling price per steer, May 13, 1907	82 68	
Average increase in value	38 82	
Average cost of feed for steer	20 95	
Amount of meal eaten by lot of 7 steers	6,274	lbs.
Amount of ensilage and roots	63,385	"
Amount of hay	3,180	"

LOT II.—INFERIOR STEERS.

Number of steers in lot	7	
First weight, gross, Nov. 14, 1906	5,955	lbs.
First weight, average	851	"
Finished weight, gross, May 13, 1907	8,820	"
Finished weight, average	1,260	"
Total gain in 180 days	2,865	"
Average gain per steer	409	"
Daily gain per steer	2·27	"
Daily gain for lot, 7 steers	15·89	
Gross cost of feed	$ 142 34	
Cost of 100 lbs. gain	4 97	
Cost of steers, 5,955 lbs. at $3 per 100 lbs.	178 65	
Total cost to produce beef, $178 65 + $142 24	326 99	
Sold, 8,820 lbs. at $4 50 per 100 lbs., less 5 per cent.	377 05	
Profit on lot	50 06	
Net profit per steer	7 15	
Average buying price per steer	25 52	
Average selling price per steer	53 86	
Average increase in value	28 34	
Average cost of feed for steer	20 33	
Amount of meal eaten by lot of 7 steers	5,765	lbs.
Amount of ensilage and roots	64,487	"
Amount of hay	3,301	"

As will have been noted, the inferior steers made almost as rapid and almost as economical gains as did the extra choice lot. The great difference in profits made by each lot being due to the difference in selling price. The extra choice lot cost $1 per 100 lbs. live weight more than did the inferior lot, but when marketed commanded $1.25 per hundred more and made somewhat cheaper gains while on feed.

'B.'

Two lots of steers of 7 each were selected in November and started on feed Nov. 14, 1906. The aim in view was to see whether it was (1) advisable to feed for the Easter market, (2) more profitable to feed steers in good condition for a shorter time or steers in low flesh for a longer period.

Lot 1, consisted of 7 steers low in flesh, but of good conformation. They weighed going into the pen, 1,095 lbs. each. Cost 4 cents delivered.

Lot 2, consisted of 7 steers so good in flesh that they were competed for by local butchers when being bought. They were of excellent conformation as well as being in good flesh. Cost 4 cents delivered. Weight, 898 pounds each.

The subjoined tables show results.

LOT I.—LONG FEED.

Number of steers in lot	7	
First weight, gross, Nov. 14, 1906	7,675	lbs.
First weight, average	1,095	"
Finished weight, gross, May 13, 1907	10,645	"
Finished weight, average	1,521	"
Total gain in 180 days	2,970	"
Average gain per steer	424	"
Daily gain per steer	2·36	"
Daily gain for lot, 7 steers	16·52	"
Gross cost of feed	$ 146 66	
Cost of 100 lbs. gain	4·26	
Cost of steers, 7,675 lbs. at $4 per 100 lbs	307 00	
Total cost to produce beef, $307 + $146 66	453 66	
Sold, 10,645 lbs. at $5 75 per 100 lbs., less 5 per cent	581 49	
Profit on lot	127 83	
Net profit per steer	18 23	
Average buying price per steer, Nov. 14, 1906	43 86	
Average selling price per steer, May 13, 1907	82 68	
Average increase in value	38 82	
Average cost of feed for steer	20 95	
Amount of meal eaten by lot of 7 steers	6,274	lbs.
Amount of ensilage and roots	63,385	"
Amount of hay	3,180	"
Average daily meal ration for group	34·3	"
Average daily meal ration per steer	4·9	"
Average daily roughage ration per steer	52·8	"

LOT II.—SHORT KEEP.

Number of steers in lot	8	
First weight, gross	7,185	lbs.
First weight, average	898	"
Finished weight, gross	9,315	"
Finished weight, average	1,164	"
Total gain in 130 days	2,130	"
Average gain per steer	266	"
Daily gain per steer	2·08	"
Daily gain for lot, 8 steers	16·64	"
Gross cost of feed	$ 97 74	
Cost of 100 lbs. gain	4 58	
Cost of steers, 7,185 lbs. at $4 per 100 lbs	287 40	
Total cost to produce beef, $97 74 + $287 40	385 14	
Sold, 9,315 lbs. at $5 50 per 100 lbs. less 5 per cent	486 69	
Profit on lot	101 55	
Net profit per steer	12 69	
Average buying price per steer	35 92	
Average selling price per steer	60 86	
Average increase in value	24 94	

Average cost of feed for steer	$	12 22	
Amount of meal eaten by lot of 8 steers		3,024	lbs.
Amount of ensilage and roots		54,000	"
Amount of hay		2,564	"
Average daily meal ration for group		23·26	"
Average daily meal ration per steer		2·91	"
Average daily roughage ration per steer		54·4	"

It will have been noted that the short keep cost slightly more per 100 lbs gain than did the long keep, due no doubt to the half finished condition in which the short keep were when feeding started.

One feature in the feeding is worthy of note: While the long feed consumed on an average 4·9 lbs. meal per steer right through the feeding period, the short keep consumed only 2·91 lbs. per steer per day. The farmer who has lots of roughage might therefore do better to feed steers for a short period and so save the last period when meal has to be fed in large quantities to maintain gains.

'C.'

The experiments with steer calves have been continued and below will be found reports on two lots of calves dropped in 1906.

These reports are interesting as showing the comparative cost of wintering calves where very little meal is fed and where a heavy meal ration is fed. The weights indicate fairly accurately the conditions of the two lots so far as flesh is concerned. Lot 2 the Full Fattening Ration bunch, making probably a better appearance than the weights indicate.

BABY BEEF.

Lot 1.—Limited Growing Ration, Dropped 1906.

Number of steers in lot		6	
First weight, gross, May 4, 1906		485	lbs.
First weight, average		80	"
Finished weight, gross, April 1, 1907		2,965	"
Finished weight, average		545	"
Total gain in 327 days		2,785	"
Average gain per steer		464	"
Daily gain per steer		1·42	"
Daily gain for lot, 6 steers		8·52	"
Gross cost of feed	$	87 31	
Cost of 100 lbs. gain		3 13	
Cost of steers, $5 each		30 00	
Total cost to produce beef, $30 + $87 31		117 31	
On hand April 1, 1907, 2,965 lbs. at $3 50 per 100 lbs.		103 78	
Profit or loss—loss		3 53	
Net loss per steer		0 59	
Average buying price per steer		5 00	
Average value per steer, April 1, 1907		17 30	
Average increase in value		12 30	
Average cost of feed for steer		14 55	
Amount of meal eaten by lot of 6 steers		2,110½	lbs.
Amount of ensilage and roots		27,510	"
Amount of hay		1,956	"
Amount of skim milk		10,146	"

The meal consumed consisted of 735 lbs. oats, 126 lbs. corn, 829½ lbs. bran, 273 lbs. barley, and 147 lbs. mixed meal. The mixture of roots and ensilage was made up of 27,510 lbs. corn ensilage and 11,508 lbs. roots. Each steer ate during the 327 days on feed, 122½ lbs. oats, 21 lbs. corn, 138 lbs. bran, 45½ lbs. barley, 24½ lbs. mixed meal, 4,585 lbs. corn ensilage, 1,918 lbs. roots, 326 lbs. hay and 1,691 lbs. skim milk.

Lot 2.—Full Fattening Ration.

Number of steers in lot..	6	
First weight, gross, May 4, 1906..	680	lbs.
First weight, average..	113½	"
Finished weight, gross, April 1, 1907..	3,615	"
Finished weight, average..	602½	"
Total gain in 327 days..	2,935	"
Average gain per steer..	489	"
Daily gain per steer..	1·49	"
Daily gain for lot, 6 steers..	8·94	
Gross cost of feed..	$ 93 24	
Cost of 100 lbs. gain..	3 18	
Cost of steers, $5 each..	30 00	
Total cost to produce beef, $93 24 + $30..	123·24	
On hand, 3,615 lbs. at $4 50 per 100 lbs..	162 68	
Profit or loss—profit..	39 44	
Net profit per steer..	6 57	
Average buying price per steer..	5 00	
Average value per steer, April 1, 1906..	27 11	
Average increase in value..	22 11	
Average cost of feed for steer..	15 54	
Amount of meal eaten by lot of 6 steers..	4,557	lbs.
Amount of ensilage and roots..	29.568	"
Amount of hay..	1,956	"
Amount of skim milk..	10.314	"

The meal consumed consisted of 1,554 lbs. oats, 2,268 lbs. bran, 735 lbs. barley. The mixture of ensilage and roots was made up of 12,390 lbs. roots and 17.178 lbs. corn ensilage. Each steer ate during the 327 days on feed, 259 lbs. oats, 378 lbs. bran, 122½ lbs. barley, 2,065 lbs. roots, 2,863 lbs. corn ensilage, 326 lbs. hay and 1,719 lbs. skim milk.

SWINE FEEDING.

I have to report a fairly successful year with swine. Most of the work has been along the line of supplying breeding stock to farmers' clubs and individual farmers desirous of improving their herds. A very considerable number have been so supplied during the past year and this has in some measure prevented the carrying on of satisfactory feeding experiments.

A number of good subjects are now available for work however, and some feeding experiments are being incepted.

During the winter months a small experiment comparing the feeding value of mangels and sugar beets was carried on.

Placing the mangels at $2 per ton it was found that pork cost $6.20 per 100 lbs.

Placing the sugar beets at $3 per ton it was found that pork cost $5 05 per 100 lbs.

When meal alone was used 100 lbs. increase live weight cost $7 03.

When along with the meal Herbageum was used in the quantities indicated by manufacturers, 100 lbs. increase live weight cost $5 23.

Lot B.—Fed on Meal and Mangels.

Meal mixture, barley 500 lbs., oats 200 lbs., shorts 500 lbs., gluten 200 lbs. Mixture cost $1 per 100 lbs. Mangels $2 per ton.

Number of pigs in lot	4
Weight to enter, Jan. 1	342 lbs.
Average weight	85½ "
Weight, March 26	532 "
Average weight	133 "
Days on feed	85 days.
Gain made by lot in 85 days	190 lbs.
Gain made per pig in 85 days	47½ "
Daily rate of gain per pig	0·55 "
Meal consumed by lot in 85 days	994½ "
Mangels consumed by lot in 85 days	1,848 "
Value of food consumed	$ 11 79½ "
Cost to produce 100 lbs. live weight	6 20

Lot C.—Fed on Meal and Sugar Beets.

Meal mixture, barley 500 lbs., oats 200 lbs., shorts 500 lbs., gluten 200 lbs. Mixture cost $1 per 100 lbs. Beets cost $3 per ton.

Number of pigs in lot	4
Weight to enter, Jan. 1	335 lbs.
Average weight	83¾ "
Weight, March 26	575 "
Average weight, March 26	143¾ "
Days on feed	85 days.
Gain made by lot in 85 days	240 lbs.
Gain made per pig in 85 days	60 "
Daily rate of gain per pig	0·70 "
Meal consumed by lot in 85 days	1,096 "
Beets consumed by lot in 85 days	1,560 "
Value of food consumed	$ 13 30
Cost to produce 100 lbs. live weight	5 05

Lot D.—Fed on Meal and Herbageum.

Meal mixture, barley 500 lbs., oats 200 lbs., shorts 500 lbs., gluten 200 lbs. Mixture cost $1 per 100 lbs. Herbageum 15 cents per lb.

Number of pigs in lot	4
Weight to enter, Jan. 1	291 lbs.
Average weight	72¾ "
Weight, March 26	570 "
Average weight, March 26	142½ "
Days on feed	85 days.
Gain made by lot in 85 days	279 lbs.
Gain made per pig in 85 days	69¾ "
Daily rate of gain per pig	0·71 "
Meal consumed by lot in 85 days	1,055½ "
Herbageum consumed by lot in 85 days	434 ozs.
Value of food consumed	$ 14 60
Cost to produce 100 lbs. live weight	5 23

Lot E.—Fed on Meal.

Meal mixture, barley 500 lbs., oats 200 lbs., shorts 500 lbs., gluten 200 lbs. Mixture cost $1 per 100 lbs.

Number of pigs in lot..........................	4
Weight to enter, Jan. 1........................	270 lbs.
Average weight.................................	67½ "
Weight, March 26...............................	431 "
Average weight, March 26.......................	107¾ "
Days on feed...................................	85 days.
Gain made by lot in 85 days....................	161 lbs.
Gain made per pig in 85 days...................	42½ "
Daily rate of gain per pig.....................	0·50 "
Meal consumed by lot in 85 days................	1,133 "
Value of food consumed.........................	$ 11 33
Cost to produce 100 lbs. live weight...........	7 03

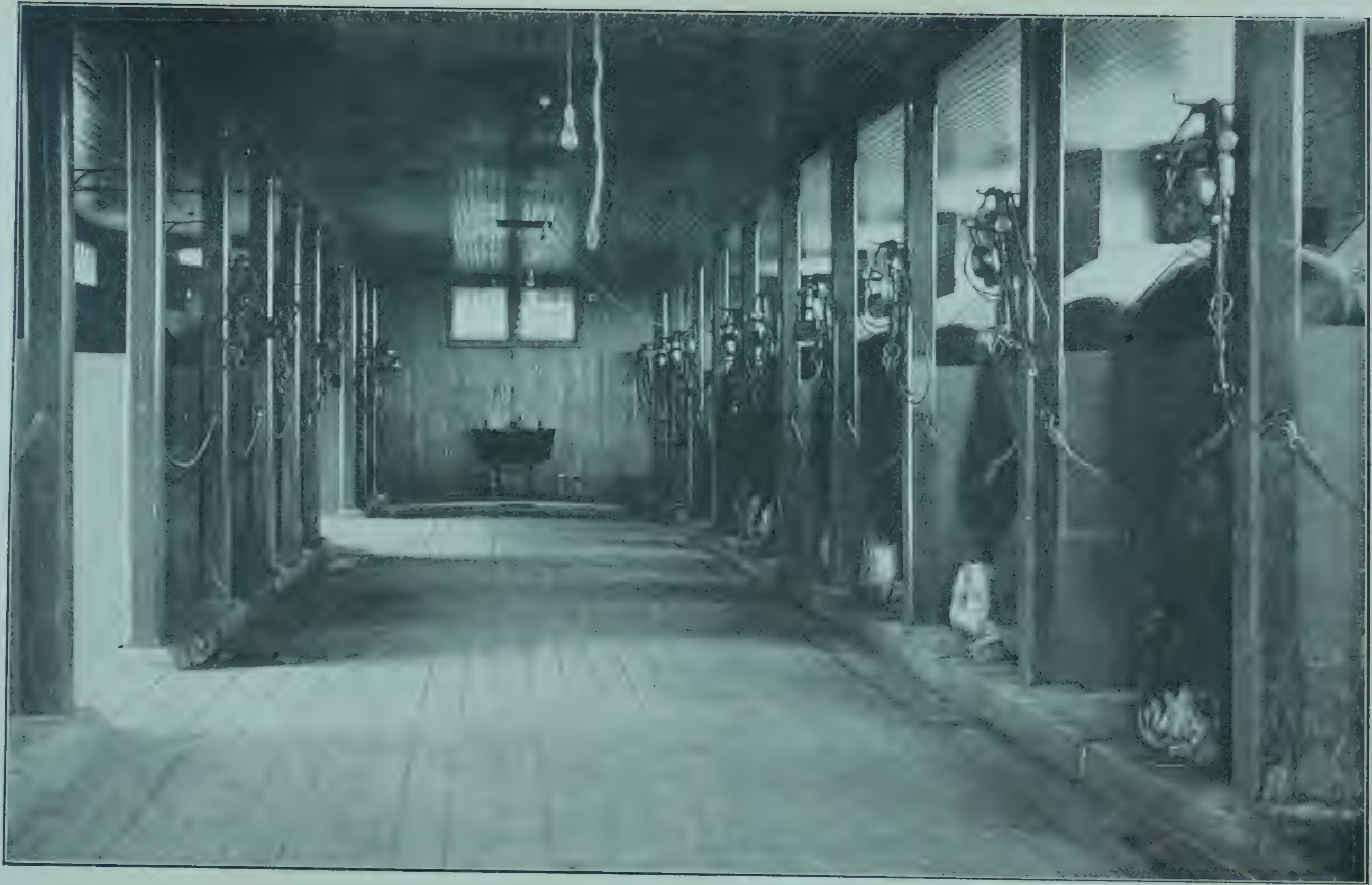
INVENTORIES.

The changing of the dates of the beginning and ending of the fiscal year necessitated the changing of the year dates in all live stock record and feeding work, it is not therefore possible to give the inventories for the date 12 months previous to the date of inventories this year, April 1, 1907.

Inventories of live stock and feed on hand April 1, 1907, follow:—

LIVE STOCK.

——	April 1, 1907.	
	Number on hand.	Value.
		$
Horses..	19	3,985 00
Cattle—		
Shorthorns:—		
Males, 3; females, 15..............................	18	4,095 00
Guernseys:—		
Males, 4; females, 13..............................	17	2,100 00
Ayrshires:—		
Males, 1; females, 17..............................	18	2,105 00
Canadians:—		
Males, 3; females, 15..............................	18	1,540 00
Grades:—		
females, 19..	19	720 00
Steers...	33	1,502 40
Sheep—		
Shropshires:—		
Males, 3; females, 13..............................	16	300 00
Leicesters:—		
Males, 3; females, 6...............................	10	190 00
Swine—		
Yorkshires:—		
Males, 4; females, 37; young stock, 101............	142	1,568 00
Berkshires:—		
Males, 2; females, 9; young stock, 20..............	31	420 00
Tamworths:—		
Males, 4; females, 8; young stock, 21..............	33	393 00
Grades:—		
Feeding stock......................................	14	56 00
Total..	388	18,974 40



INTERIOR OF HORSE STABLE, CENTRAL EXPERIMENTAL FARM, BUILT 1906.

(Photo F. T. Shutt)

FEED ON HAND.

April 1, 1907.

Estimated—		
Hay	66,500	lbs.
Straw	37,500	"
Ensilage and roots	652,000	"
Weighed—		
Potatoes	175	"
Oats	50,772	"
Seeds, small oats, &c	3,529	"
Barley	3,184	"
Mixed meal, ground	2,650	"
Oil meal	3,850	"
Peas	1,031	"
Wheat	2,508	"
Imperial	3,100	"
Nestor	200	"
Mill feed, ground seeds and barley	720	"
Cotton seed meal	1,750	"
Gluten meal	23,960	"
Corn	3,234	"
Shorts	2,000	"
Flax seed, ground	1,500	"

COMPARATIVE Statement of Crops on '200 Acre Farm,' from 1899 to 1906, inclusive. (200 Acre Farm includes 7 Acres of Roads.)

YEAR.	GRAIN.		HAY.		ROOTS AND CORN.		PASTURE.		SOILING CROP.		PIG PASTURE.		REMARKS.
	Area in Acres.	Yield in Pounds.	Area in Acres.	Yield in Tons.	Area in Acres.	Yield in Tons.	Area in Acres.	Number of Cattle.	Area in Acres.	Disposition of Crops.	Area in Acres.	Crops Grown for Pasture.	
1899........	73	118,466	39	93	40	326½	40	36	1	Fed to dairy cows	....	....	Generally considered a good year for all crops.
1900........	80	126,621	53	138	40	743	20 and aftermath.	49	....	....	....	....	Season very favourable for most crops.
1901........	79	114,472	58	210	40	702	16 and aftermath.	52	....	....	....	....	″ ″ ″
1902........	74	144,914	60	216	39	665	20 and aftermath.	62	....	....	5	Clover, rape and aftermath.	Season favourable for hay, bad for corn.
1903........	69	126,619	62	154	34	473	16 and aftermath.	96	5	Dairy cows, bulls and calves.	6	Clover and rape.	Season very unfavourable for most crops, particularly adverse to corn and roots. No second crop hay.
1904.	67	112,009	60	192	46¾	674	13·75	98	3	″ ″ ..	3	″ ″ ..	Season unfavourable for grain and corn, good for hay and roots.
1905........	66	111,932	59	258	47	971½	14 and aftermath.	100	5	All cattle ensilage fed.	4	Clover, rape, mixed crop, pease, roots.	Season favourable for hay, corn and roots, too wet for grain on mucky land.
1906........	69	125,516	62	140	48	774½	14	105	5	″ ″ ..	3	″ ″ ..	Very bad season. Meadows winter killed. Summer too dry.

Of the area indicated as having been used as pasture for swine in 1895, 3 acres yielded a crop of green feed for soiling cattle before being given over to swine. Cattle were pastured on roads where possible. A small rough field not included in the '200 Acre Farm' is used as partial pasture and a run for about 20 head of young stock. These cattle receive ensilage or other succulent food every day, and meal at the rate of about 1½ lbs. each per day part of the time.

The variety of crops grown and the varying areas under each crop each year make it quite difficult to make a comparison of the returns of the different years, so to simplify matters I would suggest that a fixed valuation be put upon the products, and the returns of each year valued accordingly.

Fixing prices as follows: Grain, $1 per hundred lbs.; roots and ensilage $2 per ton; hay $7 per ton; summering cattle, $8 per season; and an area used as pasture for pigs, $15 per acre; the returns from the '200-acre farm' for the years mentioned may be said to have been worth $2,776.66 in 1899; $4,110.21 in 1900; $4,434.72 in 1901; $4,787.14 in 1902; $4,148.19 in 1903; $4,741.09 in 1904; $5,714.32 in 1905; and $4,669.16 in 1906.

ROTATION EXPERIMENT.

The experiment to determine the effects of different rotations is being followed up and over the detailed report of the labour on each plot, and in the returns therefrom will be found some brief notes on each field and on the rotation as a whole.

The rotations are as follows:—

Rotation A.—Five years, clover hay, timothy hay, grain, corn, grain.

Rotation B.—Five years, clover hay, grain, clover hay, corn, grain.

Rotation E.—Three years, pasture, corn, grain.

Rotation Z.—Three years, clover hay, corn, grain.

Rotation S.—Four years, shallow ploughing, clover hay, timothy hay, roots, grain.

Rotation D.—Four years, deep ploughing, clover hay, timothy hay, roots, grain.

Rotation H.—Three years, hog pasture, roots, grain or soiling crop.

Rotation T.—Four years, sheep pasture, roots and soiling crop, grain, clover hay.

Rotation M.—Six years, grain, grain, clover hay, timothy hay for three years.

Rotation N.—Six years, grain, grain, timothy hay for four years.

Rotation O.—Three years, grain, timothy hay, timothy hay.

Rotation P.—Three years, grain, clover hay, timothy hay.

In the descriptions of the rotations and fields that follow, an effort is made to give as concisely as possible the location of each field, its size, the character of its soil, its drainage and its general crop history.

In the tables will be found all items of expenditure. The manure is applied in the same ratio to each field in each rotation. To illustrate: if to the corn land in rotation 'Z,' 15 tons of manure per acre is applied; this is equivalent to 5 tons per acre per annum, as Z, is a three-year rotation. Then in applying manure to M, 30 tons per acre would be applied, as M is a six-year rotation. Since the manure must vary slightly in quantity each year, $3 per annum per acre is charged in each rotation.

COMPARATIVE VALUES OF ROTATION ON STOCK FARMS.

Supposing the average animal of the bovine species to consume 2,000 lbs. hay, 1,500 lbs. meal, 16,000 lbs. roots and ensilage and 2,000 lbs. of straw per annum, which valued at prices given above would amount to $37, a rough idea of the relative value of the different rotations for stockmen may be arrived at.

ROTATION

Lot.	Location.	Description of Soil.							Area in Acres.	Crop.	Crop.	Rent and Manure.	Seed, Twine and use of Machinery.
		Sand.	Sandy loam.	Clayey loam.	Clay.	Black muck.	Gravel.	Hardpan.					
		p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	Ac.	1905.	1906.	$ cts.	$ cts.
A 1	W. S. 3	30	45	....	....	25	...	....	9·96	Grain	Corn	59 76	16 68
A 2	L. S. 1	30	65	5	....	....	....	....	8·90	Alfalfa Hay.	Grain	53 40	13 85
A 3	A. S. 14	10	15	20	20	15	....	20	10·20	Corn	Grain	61 20	16 32
A 4	W.P.G.S. 1. F. S. 1	70	20	10	....	....	...	....	9·15	Hay	Hay	54 90	13 66
A 5	F. S. 3	....	35	30	10	15	10	....	9·63	Oats	Hay	28 89	43 33
Aggregate									47·84			258 15	103 84
Average per acre in 1906									1·00			5 39	2 17

ROTATION

Lot.	Location.	Sand.	Sandy loam.	Clayey loam.	Clay.	Black muck.	Gravel.	Hardpan.	Area in Acres.	Crop. 1905.	Crop. 1906.	Rent and Manure.	Seed, Twine and use of Machinery.
B 1	W.S. 4	5	35	5	50	5	....	....	10·00	Grain	Hay	60 00	13 00
B 2	L.S. 2	20	70	....	5	5	....	....	8·82	Oats	Hay	52 92	11 46
B 3	A. S. 15	20	60	5	....	15	....	...	10·20	Clo. Hay	Corn	61 20	17 92
B 4	W.P.G.S. 2	20	60	15	....	5	....	....	9·15	Clo. Hay	Oats	54 90	14 63
B 5	F. S. 2	....	30	30	40	....	....	....	9·93	Corn	Oats	59 58	15 89
Aggregate									48·10			288 60	72 90
Average per acre in 1906									1.00			6 00	1 51

ROTATION 'A.'

This rotation of 5 years duration includes grain, hay (2 years), grain and corn or roots in the order named. The grain crop mentioned first comes after corn. With the first crop of grain is sown 10 lbs. red clover, 1 lb. alsike and 10 lbs. timothy per acre. The field is left in hay for 2 years, then in August of the second year it is ploughed and cultivated at intervals till October, when it is ridged up and left till the next spring. Oats are sown on this field, and with them red clover seed at the rate of 10 lbs. per acre. This clover is allowed to grow for something over a year or until corn seeding time the fololwing spring, when it is turned under with a shallow furrow along with the manure that will have been applied during the winter. After the corn has been harvested the land is ploughed shallow and left till the next spring.

The crops on this rotation this year have not been as satisfactory as usual, due to adverse weather conditions. On A, a fair crop of corn was harvested. On A2, oats were grown and gave fair returns. A3, also was in grain and gave a fair crop. A4, gave only a light crop of hay since no clover survived the winter and part of the timothy was destroyed. A5, gave only a light crop of hay as all clover was killed out.

'A.'

Items of Expense in raising Crop in 1906.								Particulars of Crop in 1906.						Profit per Acre in 1906.
Manual Labour.		Horse Labour.												
No. of Hours.	Cost of Manual Labour.	Hours with Single Horse.	Hours with Team.	Value of Horse Labour.	Threshing.	Total Cost.	Cost for 1 Acre.	Grain	Straw.	Hay.	Roots and Ensilage.	Total Value.	Value of Crop per Acre.	
Hrs.	$ cts.	Hrs	Hrs	$ cts.	$ cts.	$ cts.	$ cts.	Lbs.	Lbs.	Lbs.	Lbs.	$ cts.	$ cts.	$ cts.
926	138 90	....	427	128 10	...	237 35	23 83	......	......	....	297,135	297 13	29 83	6 00
70	10 50	...	245	73 50	13 23	164 48	18 48	18,005	15,445	....	....	210 94	23 70	5 22
60	9 00	....	150	45 00	12 76	142 28	14 14	17,592	33,638	....	....	243 19	23 84	9 70
80	12 00	16	35	13 70	......	94 26	10 30	....	......	45,320	....	181 28	19 81	9 51
123	18 45	7½	44½	14 85	....	105 52	10 85	.....	......	50,010	....	200 04	20 77	9 92
1,259	188 85	23½	901½	275 15	25 99	743 89	77 60	35,597	49,083	95,330	297,135	1,132 58	117 95	40 35
26	3 94	·04	19	5 75	0 54	15 54	15 54	744	1,025	1,992	6,211	23 67	23 67	8 13

'B.'

60	9 00	15	147	47 10	......	129 10	12 91	......	......	41,362	....	165 44	16 54	3 63
81	12 15	16	24	10 40	....	86 93	9 85	......	.....	33,870	....	135 48	15 34	5 49
498	74 70	20	303	94 90	......	247 72	24 28	...	......	....	308,720	308 72	30 26	5 98
80	12 00	4	127	38 90	12 30	132 73	14 61	16,959	22,180	....	....	213 95	23 38	8 77
69	10 35	5	110½	34 15	10 15	130 12	13 10	14,000	27,900	....	....	195 80	19 71	6 61
788	118 20	60	711½	225 45	22 45	726 60	15 10	30,959	50,080	75,232	308,720	1,019 39	21 19	30 48
16	2 45	1·2	15	4 68	0 46	15 10	15 10	643	1,411	1,564	6,418	21 19	21 19	6 09

ROTATION 'B.'

This rotation of 5 years duration includes grain, hay, corn or roots in the order named, the first crop of grain following a crop of corn or roots. Red clover 10 lbs., alsike 1 lb. and timothy 5 lbs. is sown with the grain each time grain is sown. When grain follows hay the land is ploughed in the early fall. When corn follows hay the land is ploughed in the spring, the spring growth of grass and clover being ploughed in along with the manure which will have been applied during the preceding winter.

The crops on this rotation fell short of the average. The crop of hay on B1 was made up of sorghum, millet and Hungarian grass since not a sign of what had been a splendid catch of clover and timothy remained. The hay crop on B2 was short; no clover. On B4, oats were grown giving only a light crop on account of adverse weather conditions. On B5 also the grain crop was light.

ROTATION

Lot.	Location.	Description of Soil. Sand.	Sandy loam.	Clayey loam.	Clay.	Black muck.	Gravel.	Hardpan.	Area in acres.	Crop.	Crop.	Rent and Manure.	Seed, Twine and use of Machinery.
		p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	Ac.	1905.	1906.	$ cts.	$ cts.
D 1........	E.G.P.S. 2.	20	80	....	....	....	....	....	2	Hay.......	Hay........	12 00	1 60
D 2........	E.G.P.S. 4.	20	80	....	....	....	....	....	2	Hay.......	Roots.......	12 00	1 60
D 3........	E.G.P.S. 6.	30	70	....	....	....	....	....	2	Roots	Grain	12 00	3 20
D 4........	E.G.P.S. 8.	60	40	....	....	....	....	....	2	Oats..	Oat-Hay....	12 00	2 60
	Aggregate....								8	....	....	48 00	9 00
	Average per acre in 1906.......								1	....	....	6 00	1 12

ROTATION

Lot.	Location.	Sand.	Sandy loam.	Clayey loam.	Clay.	Black muck.	Gravel.	Hardpan.	Area in acres.	Crop. 1905.	Crop. 1906.	Rent and Manure.	Seed, Twine and use of Machinery.
S 1.........	E.G.P.S. 1.	20	80	....	....	....	....	....	2	Clover Hay.	Tim. Hay ..	12 00	1 60
S 2.........	E.G.P.S. 3.	20	80	....	....	....	....	....	2	Clover Hay.	Roots	12 00	1 60
S 3.........	E.G.P.S. 5.	30	70	....	....	....	....	....	2	Roots	Grain	12 00	3 20
S 4.......	E.G.P.S. 7.	60	40	....	.. .	....	....	....	2	Oats.. .. .	Oat-Hay....	12 00	2 60
	Aggregate..................								8	....	....	48 00	9 00
	Average per acre in 1906................								1	....	....	6 00	1 12

ROTATION 'D.'

Deep Ploughing.

This rotation is of 4 years duration and includes grain, 2 years hay and roots.

The grain crop follows roots, the root land being ploughed to a depth of about 7 inches after the roots are harvested in the fall. With the grain is sown 10 lbs. red clover, 1 lb. alsike and 10 lbs. timothy seed per acre. The clover hay is cut twice in the season and the second aftermath left on the field, that is it is not pastured off as is usually done. In the second hay year two crops are cut if possible, and the land ploughed in August with a deep 7-inch furrow.

D1.—This plot was under hay and gave a very good crop considering the season.

D2.—This plot was in roots. They made a splendid start and offered to be a very heavy crop until about the middle of July, when the dry weather began to affect them.

D3.—This field was in grain (oats) and gave only poor returns.

D4.—This field should have been in clover hay but when spring came no sign of clover or grass was in evidence and so all the field had to be ploughed up and put under oat and pea hay.

'D.'

Items of Expense in raising Crop of 1906.								Particulars of Crop of 1906.						Profit per Acre in 1906.
Manual Labour.		Horse Labour.			Threshing.	Total cost.	Cost for 1 Acre.	Grain.	Straw.	Hay.	Roots and Ensilage.	Total Value.	Value of Crop per Acre.	
No. of Hours.	Cost of Manual Labour.	Single Horse.	Hours with Team.	Value of Horse Labour.										
Hrs.	$ cts.	Hrs	Hrs	$ cts.	$ cts.	$ cts.	$ cts.	Lbs.	Lbs.	Lbs.	Lbs.	$ cts.	$ cts.	$ cts.
25½	3 82	....	10	4 10	......	21 52	10 76	......	......	8,900	....	35 60	17 80	7 04
295	44 25	....	45½	18 25	......	76 10	38 05	......	......	....	80,500	80 50	40 25	2 20
15	3 00	....	30	10 80	1 90	30 90	15 45	2,630	6,030	....	....	38 36	19 18	3 73
17	2 55	....	29	9 50	......	26 65	13 32	......	......	11,240	....	44 96	22 48	9 16
352½	53 62	....	114½	42 65	1 90	155 17	77 58	2,630	6,030	20,140	80,500	199 42	99 71	22 13
44	6 70	...	14	5 33	0 24	19 39	9 69	329	754	2,517	10,062	24 93	24 93	5 54

'S.'

25½	3 82½	5	9	3 70	.....	21 12½	10 56	......	......	9,165	....	36 66	18 33	7 77
295	44 25	23	45½	18 25	......	76 10	38 05	.....	......	....	81,285	81 28	40 64	2 59
20	3 00	....	26	10 80	1 90	30 90	15 45	2,630	5,820	....	....	37 94	18 97	3 52
17	2 55	4	29	9 50	.....	26 65	13 32	.....	......	11,150	....	44 60	22 30	8 92
357½	53 ·62½	32	109½	42 25	1 90	154 77½	77 38	2,630	5,820	20,315	81,285	200 48	100 24	22 80
45	6 70	4	14	5 28	0 24	19 35	9 67	329	727	2,539	101,606	25 06	25 06	5 91

ROTATION 'S.'

Shallow Ploughing.

This rotation is of 4 years duration and includes grain, 2 years hay and roots.

The grain crop follows roots, the root land being ploughed (or cultivated) to a depth of about 4 inches after the roots are harvested in the fall. With the grain is sown 10 lbs. red clover, 1 lb. alsike and 10 lbs. timothy seed per acre. The clover hay is cut twice in the season and the second aftermath left on the field, that is, it is not pastured off as is usually done. In the second hay year two crops are cut if possible and the land ploughed in August with a shallow 4-inch furrow. If manure is applied before ploughing a sub-soiler is attached to the plough to loosen up the subsoil to a depth of 8 or 9 inches. If manure is not applied this end is attained by means of a strong deep-cutting cultivator after the sod has rotted in the fall, or next spring.

S1.—This plot was under hay and gave a very good crop considering the season.

S2.—This plot was in roots. They made a splendid start.

S3.—This plot was in grain (oats) and gave only poor returns.

S4.—This plot was in hay. (See D4.)

ROTATION

Lot.	Location.	Description of Soil.							Area in Acres.	Crop.	Crop.		
		Sand.	Sandy Loam.	Clayey Loam.	Clay.	Black Muck.	Gravel.	Hardpan.				Rent and Manure.	Seed Twine and use of Machinery.
		p.c.	p.c.	p.c.	p.c.	p.c.	p.c.	p.c.	Ac.	1905.	1906.	$ cts.	$ cts.
E 1	W.S. 1	40	40	....	....	15	5	....	14·00	Oats	Pasture	84 00	84 00
E 2	L.S. 4	10	60	10	....	20	....	....	13·75	Corn	Grain	82 50	22 40
E 3	Morn.	30	60	5	....	5	....	....	14·00	Pasture	Corn	84 00	23 40
	Aggregate								41·75			250 50	129 80
	Average per acre in 1906								1·00			6 00	3 11

ROTATION

Z 1	W.S. 2	40	40	....	....	15	5	....	6·00	Oats	Hay	36 00	16 20
Z 2	L.S. 3	10	60	10	....	20	....	....	5·81	Corn	Grain	34 86	9 46
Z 3	Obs. S	10	60	20	10	....	....	....	4·2	Hay	Corn	25 20	5 00
	Aggregate								16·01			96 06	30 66
	Average per acre in 1906								1·00			6 00	1 91

ROTATION 'E.'

This rotation of three years' duration includes grain, pasture and corn.

The grain comes after the corn, the stubble of which is treated as described under rotation 'A.' With the grain in the spring is sown 10 lbs. red clover, 1 lb. alsike clover, 5 lbs. alfalfa and 5 lbs. timothy seed per acre. If weather permits the field is pastured slightly in the fall.

After the grain crop the land is pastured, the grass seeding having been done with this object in view. In estimating the value of the returns from this field, pasture is charged at $1 per month per cow. At this rate the returns fall very far short of what would have been the returns if a hay crop had been harvested, if we may judge by the returns from 'Z 2.' This rotation and rotation Z were introduced into the list in order to gain some idea as to the difference in returns probable from land pastured and land from which all the crops are harvested. Of course the corn crop after the pasture has in a measure made up for the difference in favour of the no pasture rotation 'Z,' but the returns are on the whole still considerably short of those from 'Z.'

Corn follows the pasture. Manure applied during the fall and winter and turned under with the growth of clover and grass in the spring.

'E.'

Items of Expense in Raising Crop in 1906.								Particulars of Crop in 1906.							
Manual Labour.		Horse Labour.													
No. of Hours.	Cost of Manual Labour.	No. of Hours with Single Horse.	No. of Hours with Team.	Value of Horse Labour.	Threshing.	Total Cost.	Cost for 1 Acre.	Grain.	Straw.	Hay.	Roots and Ensilage.	Total Value.	Value of Crop per Acre.	Profit per Acre in 1906.
Hrs.	$ cts.	Hrs	Hrs	$ cts.	$ cts.	$ cts.	$ cts.	Lbs.	Lbs.	Lbs.	Lbs.	$ cts.	$ cts.	$ cts.
......	......	...	....	.....	......	168 00	12 00	.....	......	....	....	*143 00	10 21	†1 79
173	25 95	....	238	71 40	14 33	216 58	15 75	19,778	38,252	....	... .	274 28	19 94	4 19
715	107 25	20	363	112 90	.....	327 56	23 39	....	......	....	387,745	387 74	28 27	4 88
888	133 20	20	601	184 30	14 33	712 13	51 14	19,778	38,252	....	387,745	805 02	58 42	7 28
21·2	3 19	·48	14·4	4 41	0 34	17 05	17 05	473	916	....	928	19 28	19 28	2 42

'Z.'

No. of Hours.	Cost of Manual Labour.	No. of Hours with Single Horse.	No. of Hours with Team.	Value of Horse Labour.	Threshing.	Total Cost.	Cost for 1 Acre.	Grain.	Straw.	Hay.	Roots and Ensilage.	Total Value.	Value of Crop per Acre.	Profit per Acre in 1906.
42	6 30	6	22	7 80	.....	66 30	11 05	......	......	26,980	....	107 92	17 97	6 92
52	7 80	....	30½	24 15	......	82 02	14 11	7,825	15,435	....	....	109 10	18 79	4 68
110	16 50	8	122	38 20	......	84 90	20 21	......	......	....	129,637	129 64	30 87	10 66
204	39 60	14	174½	70 15	......	233 22	45 37	7,825	15,435	26,980	129,637	346 66	67 63	22 26
12·7	1 91	·08	10·9	4 38	......	14 56	14 56	489	964	1,685	8,097	21 65	21 65	7 09

* 143 months' pasture (cows).
† Loss.

ROTATION 'Z.'

This rotation of three years' duration includes corn, grain and clover hay, in the order named.

Corn comes after the clover hay. The manure is applied in the fall or during the winter and spring, and the clover allowed to grow up through it, so facilitating the turning under of the whole mass of manure and spring growth and late fall growth of clover a few days before the corn is to be sown. The furrow turned is quite shallow, about 5 inches deep, and the land is then thoroughly disc-harrowed and the corn sown in rows 42 inches apart. It receives later the usual cultivation and care.

Grain follows corn, the land having been ploughed in the fall. With the grain there is sown 10 lbs. red clover, 1 lb. alsike and 5 lbs. timothy seed. The hay is cut twice and the last aftermath allowed to grow up, to be turned under the next spring for corn. Such a rotation would be particularly valuable to a farmer having sufficient rough land for pasture or for one desirous of keeping as many cattle as possible on the land at his disposal, supposing him willing to grow roots and corn.

ROTATION

Lot.	Location.	Description of Soil.							Area in Acres.	Crop.	Crop.		
		Sand.	Sandy loam.	Clayey loam.	Clay.	Black muck.	Gravel.	Hardpan.				Rent and Manure.	Seed, Twine and use of Machinery.
		p.c.	p.c.	p.c.	p.c.	p.c.	p.c.	p.c.	Ac.	1905.	1906.	$ cts.	$ cts.
H 1........	H.S. 1.....	30	40	20	10	....	....	....	3 35	Roots	Oat Hay....	20 10	4 35
H 2........	H.S. 2.....	25	45	20	10	....	....	....	3 15	Grain	Pasture.....	18 90	4 72
H 3........	H.S. 3.....	10	20	50	20	....	....	....	2 85	Hay, Grain, Pasture...	Roots	17 10	3 72
	Aggregate........................								9 35	....	....	56 10	12 79
	Average per acre in 1906............								1 00	.. ..	....	6 00	1 36

ROTATION

T 1........	S.S. 1......	10	90	....	....	....	....	....	1 51	Hay........	Pasture.....	9 06	2 45
T 2	S.S. 2......	15	85	....	....	....	....	....	2 44	Roots	Hay..	14 64	2 73
T 3........	S.S. 3......	....	100	....	....	....	.. ..	....	3 27	Pasture.....	Pasture.....	19 62	1 50
T 4........	S.S. 4	15	85	....	....	....	....	....	3 50	Pastnre.....	Roots	21 00	4 55
	Aggregate.................... .. .								10 72	....	....	64 32	11 23
	Average per acre in 1906.								1 00	....	....	6 00	1 04

ROTATION 'H.'

Hog Farm.

This rotation is of three years' duration and includes roots, soiling crop and pasture in the order named. The land is ploughed late in the fall after it has been manured. It is disked the next spring and the roots sown on ridges. The roots receive the usual cultivation and are of a varied character, including mangels, sugar mangels, sugar beets and turnips devoted to pork production for the most part, the surplus being sold to cattle and the returns invested in meal for pig feeding.

The soiling crop field is sown with various crops suitable for feeding to pigs. What is over and above the amount possible of consumption by pigs is sold to cattle at $2 per ton and the returns used to purchase meal for pork production.

The pasture area is divided into several parts, the seed being sown as far as possible at the same time as the soiling crops the previous year, and not allowed to be eaten too close the first fall, although any good growth is not wasted.

H1.—This field was this year under oats and peas mixture to cut for green feed. The crop was good and was fed to cattle and swine.

H2.—This field was pastured off, but did not prove very satisfactory as all the clover had been killed.

H3.—On this field were grown mangels, sugar mangels and sugar beets with fairly satisfactory results.

'H.'

Items of Expense in raising Crops, 1906.								Particulars of Crop of 1906.						
Manual Labour.		Horse Labour.												
Hours.	Cost of Manual Labour.	Hours, (Single Horse.)	Hours, (Team Horses.)	Value of Horse Labour.	Threshing.	Total Cost.	Cost for 1 Acre.	Grain.	Straw.	Hay.	Roots and Ensilage.	Total Value.	Value of Crop per Acre.	Profit per Acre in 1906.
Hrs.	$ cts.	Hrs	Hrs	$ cts.	$ cts.	$ cts.	$ cts.	Lbs.	Lbs.	Lbs.	Lbs.	$ cts.	$ cts.	$ cts.
40	6 00	16	65	22 70	......	53 15	15 86	......	.....	21,085	....	84 34	22 19	6 33
......	.....	....	....	......	.....	24 62	7 50	....	......	... .	....	*47 25	15 00	7 50
484	72 60	24	60	22 80	......	116 22	40 77	.....	......	....	106,300	131 83	46 22	5 45
524	78 60	40	125	45 50	. ....	193 99	64 13	.....	......	21,085	106,300	263 42	83 41	19 28
56·	8 40	4·2	13·3	4 86	......	20 74	6 85	.....	......	2255	11,369	28·17	8 92	2 06

* Pasture valued at $15 per Acre.

'T.'

......	......	....	....	......	......	11 51	7 74	......	......	....	....	*16 00	10 60	2 86
28	4 20	8	42	13 20	.....	35 77	14 66	. .	.....	11,260	....	45 04	18 45	3 79
......	.....	....	....	......	......	21 00	6 45	......	......	....	....	†34 76	10 63	3 18
571	85 65	56	114½	45 55	....	156 75	44 78	......	......	....	157,703	157 70	45 05	0 27
599	89 85	64	156½	58 75	...	225 03	73 63	......	.....	12,260	157,703	253 50	84 73	10 10
55·	8 38	5·9	14·5	5 48	....	20 99	6 86	. ....	....	1050	14,711	23 64	7 90	0 94

* 1,600 days pasture at 1 cent per day.
† Pasture 1 sheep, 1 cent per day.

ROTATION 'T.'

Sheep Farm.

This rotation of four years duration includes roots, grain, hay and pasture.

The area devoted to sheep farming is rather limited, about 10·72 acres. This area is not included in the '200-acre farm.' The whole field had been for several years devoted to pasturing sheep, but it has been divided into four rather unequal fields susceptible of further subdivision and devoted to a rotation considered suitable for sheep.

The root field is devoted to white turnips, Swedes, cabbage, Kohl Rabi, thousand headed kale, rape, &c. It comes after the pasture, the land being manured and ploughed in the fall.

Grain follows the root land, and with the grain various clovers and grass seeds are sown to prepare for the ensuing two years. The grain may be harvested or used as soiling crop for sheep. The hay field is expected to give one crop of hay and then be devoted to pasture for lambs as soon as they are weaned.

The pasture field is the field that has been hay the previous year. Alfalfa, red clover, alsike clover, *Bromus inermis* and timothy are the clovers and grasses used. The crops on this rotation were fairly satisfactory this year.

ROTATION

Lot.	Location.	Description of Soil.							Area in Acres.	Crop.			
		Sand.	Sandy loam.	Clayey loam.	Clay.	Black muck.	Gravel.	Hardpan.				Rent and Manure.	Seed, Twine and use of Machinery.
		p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	Ac.	1905.	1906.	$ cts.	$ cts.
M 1........	A.S. 2......	....	30	15	....	45	....	10	1	Oats..........	Hay......	6 00	1 30
M 2........	A.S. 4......	....	30	15	....	45	....	10	1	Clover Hay...	Oat Hay .	6 00	1 30
M 3........	A.S. 6......	....	30	15	....	45	....	10	1	〃 ...	Grain	6 00	1 55
	Aggregate......								3	....	....	18 00	4 15
	Average per acre in 1906....								1	....	. ...	6 00	1 38

ROTATION

N 1........	A.S. 3......	....	30	15	....	45	....	10	1	Oats..........	Hay......	6 00	1 30
N 2........	A.S. 5......	....	30	15	....	45	...	10	1	Timothy Hay.	Oat Hay..	6 00	1 30
N 3........	A.S. 7......	....	30	15	....	45	....	10	1	〃 .	Grain	6 00	1 55
	Aggreate......								3	....	....	18 00	4 15
	Average per acre in 1906....								1	....	....	6 00	1 38

ROTATION 'M.'

This rotation of six years duration includes in its crops grain, grain, clover hay and then timothy hay or mixed hay for three years. First year grain is sown on sod ploughed late in the fall. In the spring the land is disked, harrowed and sown with 10-pounds of red clover seed per acre at the same time as the grain is sown. After the grain is harvested the clover is allowed to grow as late as possible and the land ploughed the last thing in the fall. The next spring 8 pounds of red clover and 10 pounds timothy seed is sown with the grain and the land put in as good shape as possible.

Clover hay follows the second year grain. It is cut twice in the year and the last aftermath not pastured.

Timothy hay or mixed hay then occupies the land for three consecutive years. Manure is applied in the fall of the second year that the field is under hay.

M1.—This field had been seeded down to hay, but catch was killed in winter, so had to be put in oat, pea and vetch hay. The crop was satisfactory.

M2.—This field shared the fate of 'M1' in the winter and, like it, had to be seeded to oat, pea and vetch hay in the spring of 1906.

M3.—This field was in grain. On account of part of the field being mucky in character it was weedy this year and had to be cut green.

'M.'

Items of Expense in raising Crop in 1905.								Particulars of Crop of 1906.						
Manual Labour.		Horse Labour.												
Hours.	Cost of Manual Labour.	Single Horse.	Team.	Cost of Horse Labour.	Threshing.	Total Cost.	Cost for 1 Acre.	Grain.	Straw.	Hay.	Roots and Ensilage.	Total Value.	Value of Crop per Acre.	Profit per Acre in 1906.
	$ cts.	Hrs	Hrs	$ cts.	$ cts.	$ cts.	$ cts.	Lbs.	Lbs.	Lbs.	Lbs.	$ cts.	$ cts.	$ cts.
5	0 75	2	20	6 40	......	14 45	14 45	......	......	4,360	....	17 44	17 44	2 99
5	0 75	2	20	6 40	......	14 45	14 45	......	......	5,173	....	20 69	20 69	6 24
9	1 35	....	19	5 70	1 10	15 70	15 70	1,527	4,233	....	....	23 74	23 74	8 04
19	2 85	4	59	18 50	1 10	44 60	44 60	1,527	4,233	9,533	....	61 87	61 87	17 27
6	0 95	1·3	19	6 17	0 37	14 87	14 87	509	1,411	3,178	....	20 62	20 62	5 76

'N.'

5	0 75	2	20	6 40	......	14 45	14 45	......	......	3,640	....	14 52	14 52	0 07
5	0 75	2	20	6 40	......	14 45	14 45	......	......	4,746	....	18 98	18 98	4 53
9	1 35	...	19	5 70	0 83	15 43	15 43	1,153	3,127	....	....	17 77	17 77	2 34
19	2 85	4	59	18 50	0 83	44 33	44 33	1,153	3,127	8,386	....	51 27	51 27	6 94
6	0 95	1	19	6 17	0 28	14 78	14 78	384	1,042	2,795	....	17 09	17 09	2 31

ROTATION 'N.'

This rotation of six years' duration includes in its crop grain, grain and timothy hay for four years.

The first year's grain is sown on land that had been ploughed six inches deep the fall previous. No grass or clover seed of any kind is sown with it. The stubble is ploughed in the fall and with the grain of the second year timothy seed is sown at the rate of 12 pounds per acre. Every care is taken to insure a good catch and the land put in as good shape as possible to remain in meadow four years.

Timothy hay is then the crop for four years, manure being applied in the fall of the second year of hay.

N1.—This field should have been in hay but was frozen out and so had to be sown to oat, pea and vetch hay.

N2.—This field should have been in hay but was frozen out so was sown to oat, pea and vetch hay.

N3.—This field was in grain. It includes a considerable area of black muck, which part was infested with weeds and had to be cut and fed green.

ROTATION

Lot.	Location.	Description of Soil.							Area in Acres.	Crop.	Crop.	Rent and Manure.	Seed, Twine and use of Machinery.
		Sand.	Sandy loam.	Clayey loam.	Clay.	Black muck.	Gravel.	Hardpan.					
		p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	Ac.	1905.	1906.	$ cts.	$ cts.
O 1........	A.S. 8.......	....	30	15	....	45	....	10	1	Tim. Hay...	Tim. Hay ..	6 00	1 30
O 2........	A.S. 10.....	....	30	15	....	45	....	10	1	Oats	Grain . ..	6 00	1 55
O 3........	A.S. 12	....	30	15	....	45	....	10	1	Tim. Hay..	Oat Hay....	6 00	1 30
	Aggregate								3			18 00	4 15
	Average per acre in 1906........ ...								1			6 00	1 38

ROTATION

Lot.	Location.	Sand.	Sandy loam.	Clayey loam.	Clay.	Black muck.	Gravel.	Hardpan.	Area in Acres.	Crop. 1905.	Crop. 1906.	Rent and Manure.	Seed, Twine and use of Machinery.
P 1...... .	A.S. 9......	....	30	15	....	45	...	10	1	Clover Hay.	Hay	6 00	1 30
P 2........	A.S. 11.....	....	30	15	...	45	....	10	1	Oats.......	Grain	6 00	1 55
P 3........	A.S. 13.....	....	30	15	....	45	...	10	1	Clover Hay.	Oats........	6 00	1 30
	Aggregate...........								3			18 00	4 15
	Average per acre in 1906								1			6 00	1 38

ROTATION 'O.'

This rotation is of three years' duration and includes grain, timothy hay, timothy hay.

The field intended for grain is ploughed early in the fall and cultivated at intervals to insure the sod rotting. It is ploughed again late in the fall and with the grain, the next spring, timothy seed is sown at the rate of 12 lbs. to the acre.

Timothy hay is cut for two years and the land again ploughed early in the fall. Manure is applied in the fall of the first year under hay.

O1.—This field was again under timothy hay.

O2.—This field was oats. It includes a very considerable portion of black mucky soil. This part of the field was on account of the adverse season, infested with weeds and the crop on that part had to be cut and fed green. This was allowed for in giving returns above.

O3.—This field was under oat hay. It should have been in timothy hay, but was frozen out in the winter 1905-6.

'O.'

Items of Expense in raising Crop in 1906.								Particulars of Crop of 1906.						
Manual Labour.		Horse Labour.												
No. of Hours.	Cost of Manual Labour.	Hours with Single Horse.	Hours with Team.	Value of Horse Labour.	Threshing.	Total Cost.	Cost for 1 Acre.	Grain.	Straw.	Hay.	Roots and Ensilage.	Total Value.	Value of Crop per Acre.	Profit per Acre in 1906.
Hrs.	$ cts.	Hrs	Hrs	$ cts.	$ cts.	$ cts.	$ cts.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	$ cts.	$ cts.
6	0 90	2½	15¾	5 22½	......	13 42½	13 42½	.... .	.....	2,280	....	8 38	8 38	*4 54
9	1 35	....	19¼	5 77½	0 76	15 43	15 43	1,051	2,275	....	....	15 06	15 06	*0 37
6	0 90	2	18½	5 95	......	14 15	14 15	......	......	4,460	....	17 84	17 84	3 69
21	3 15	4½	53½	16 95	0 76	43 00½	43 00½	1,051	2,275	6,740	....	41 28	41 28	0 41
7	1 05	1½	18	5 65	0 25	14 33	14 33	350	758	2,247	.. ..	13 76	13 76	0 41

'P.'

6	0 90	2½	15¾	5 22½	......	13 42½	13 42½	......	......	2,780	....	11 02	11 02	*2 40
9	1 35	...	19¼	5 77½	0 92	15 59	15 59	1,280	3,485	....	... .	19 77	19 77	4 18
6	0 90	2	18½	5 95	0 90	14 15	14 15	......	.....	3,350	....	13 40	13 40	*0 75
21	3 15	4½	53½	16 95	1 82	43 16½	14 39	1,280	3,485	6,130	....	44 19	14 74	0 34
7	1 05	1½	18	5 65	0 61	14 39	14 39	427	1,163	2,043	....	14 73	14 73	0 34

* Loss.

ROTATION 'P.'

This rotation is of three year's duration and includes grain, clover hay, and timothy hay or mixed hay.

The field intended for grain is ploughed early the previous fall and cultivated at intervals to insure the sod rotting. It is again ploughed late in the fall and left till seed time next spring. With the grain is sown ten pounds clover and ten pounds timothy.

Manure is applied in the fall of the first year of hay.

P1.—This field was supposed to be under hay, but was frozen out in the winter and had to be seeded down again. It gave a crop of oat, pea and vetch hay this year.

P2.—This field was in grain (oats); the crop suffered from the fact of a part of the field being of a peaty nature. Allowance was made in making calculations.

P3.—The field was frozen out in the winter and this year gave a crop of oat, pea and vetch hay.

REPORT OF THE HORTICULTURIST.

(W. T. Macoun.)

March 31, 1907.

Dr. Wm. Saunders, C.M.G.,
Director Dominion Experimental Farms,
Ottawa.

Sir,—I have the honour to submit herewith the twentieth Annual Report of this division, in which will be found the results of some of the more important experiments conducted during the year and information regarding other work of the Horticultural Division.

I have the honour to be, sir,
Your obedient servant,
W. T. MACOUN,
Horticulturist.

CHARACTER OF SEASON AND EFFECT OF WINTER OF 1905-6 ON VEGETATION.

Since the year 1898 a record has been kept of the character of each season from a horticultural standpoint, and some facts regarding the weather have been published in the Annual Report of the Horticulturist since that time. Owing to the Interim Report being published last summer, which was somewhat different from the regular annual report, no account of the previous winter was published, hence in order to make the record complete it is necessary to go back to December, 1905. December of that year was a mild month. There was no sleighing of any account until the first week of the month. At no time during December could there have been more than a foot of snow on the ground. The lowest temperature in December was on the 16th, when it was 13·1° F. below zero. January was a mild month with changeable weather and very little snow on the ground, there being only about six inches on the 15th. On February 14th, a month later, there were still only about six inches of snow on the ground, and the fields were bare in some places. There were also frozen pools of water here and there which threatened injury to trees, shrubs, and herbaceous plants. By the 22nd of the month the sleighing was practically gone. February was a colder month than January, but mild for the time of the year. The lowest temperature of the winter was 21·8° F. below zero on February 2.

On March 1 the following record was made: 'It has been quite cold again this week, the temperature falling to eight degrees below zero. Great injury is likely to occur to strawberry plantations and to herbaceous plants generally as the ground is for the most part bare of snow and where it is not bare it is covered with ice. There is a great deal of ice on the lawns and in the orchard. The lower part of the strawberry plantation is nearly covered with ice. The soaking of the few inches of soil which had thawed out by the rain on February 25, followed by the severe frost must have been very hard on the roots of plants.' Thawing and freezing continued and on March 12 there were still large patches of ice in the orchard and part of the strawberry plantation was still covered with ice. While the weather was very changeable with several thaws, March was a cold month on the whole.

The effect of the unusual winter of 1905-6 was very marked on vegetation, especially on herbaceous plants. Practically all strawberry plants in the vicinity of Ottawa and at the Experimental Farm were destroyed, even where well mulched with straw. Where snow lay heavily along the fences they were better protected and came through the winter in fair condition. Other herbaceous perennials suffered badly although at the Experimental Farm, where the snow lies heavily on the border they were comparatively little injured. In some gardens in Ottawa the growers lost practically all the perennials they had. The plants which suffered most were, as a rule, those with fleshy roots. In a border containing over 2,000 species and varieties at the Experimental Farm, 277 were killed. Deciduous trees and shrubs, including fruit trees and bushes, suffered considerably more than usual, but not as much as might have been expected.

Evergreens suffered most, the different varieties of the American Arbor Vitæ being badly affected. Some were killed outright, while others had branches destroyed. The varieties which suffered least were *Thuya occidentalis wareana* and *Thuya occidentalis globosa,* the former not being injured in the least. In exposed places the native American Arbor Vitæ were badly injured. By April 16, the frost was out of the ground in most places and the first ploughing was done in the orchard on that day and also the first digging with the spade. Even by April 21 there was still some frost in the ground and up to that time there had been little growth. The highest temperature in April was on the 19th, when the temperature was 71·6° F. above zero. The lowest was 17° F. on the 7th. May was rather cool on the whole with changeable weather although there were a few warm days. The highest temperature was 89·8° F. on the 18th, and the lowest 28·8° F. on the 11th. The last spring frost recorded by the thermometer was on May 21, when the temperature was 29·8° F. June was a warm month, although no very high temperatures were recorded, the highest being 89° F. on the 15th and 21st. The temperature was over 80° F. thirteen times in June. There were a number of showers during the month which with the heat caused vegetation to recover remarkably from the injurious effects of the winter. July was a very warm, dry month, the temperature being 80° F. and above no less than twenty-two times during the month. The highest temperatures were 93° F. on the 15th, and 93·6° F. on the 22nd.

From July 12 to August 12 the temperature was 80° F. and above every day except one. The highest temperature in August and the hottest days of summer were on August 18 and 19, when the temperature rose to 96° F. and 96·6° F., respectively.

On September 11 and 12 the following notes were made: 'Rain is very badly needed, the grass is brown except in spots and trees and shrubs have a parched look and are showing the want of moisture very much. Many leaves of elms have turned yellow and are falling. Fruit trees have not suffered much except young plum trees, which are suffering. The soil is very dry.' There were some very high temperatures in September, the two highest being on the 9th and 12th, when the thermometer recorded 91° F. and 92° F., respectively. There was a good rain on September 29, and again on October 6. The weather in October was fine and warm for the season of the year. The highest temperature was 75·8° F. on the 4th. The first autumn frost recorded was on October 1, when the temperature was 30° F.

The first severe frost of the season was on October 12, when the grape leaves were killed, the lowest previous temperature having been on October 8, when 29·1° F. were recorded.

There was a fall of snow on November 9, but this disappeared again the next day. On the 14th the ground froze hard, the temperature dropping to 7° F. above zero on the 15th, but thawed out again. Winter set in on November 26 with a heavy snowfall and the ground unfrozen. The lowest temperature in November was 7·4° F. on the 15th. December, January, and February were all cold months, although the temperatures were not as low as in some winters. There was a thaw during the first week of January. The amount of cloudy weather was very marked during the winter, but the snowfall was not heavy, there never being more than about two feet on the level during the winter. The lowest temperature during the winter was on December 8, 1906, when the thermometer registered 25·2° F. below zero. The temperature rose above the freezing point on March 12, at which time there were about two feet of snow on the level. The snow went away gradually as frosty weather with snowfalls occurred at intervals.

During the winter the temperature fell below zero fifty-two times.

FRUIT AND VEGETABLE CROPS.

The crop of apples in the provinces of Ontario and Quebec was a light to medium one on the whole in 1906. The yield of summer and autumn kinds was a medium one in some places, but below medium in others. Of winter apples there were very few in Eastern Ontario and the province of Quebec, but in Central anl Western Ontario the crop ran light to medium. The Apple Spot was not so injurious as usual, but codling moths were very numerous and there was a large proportion of wormy fruit. The Sooty Fungus disfigured the apples considerably. The great heat and dry weather in Eastern Ontario and Quebec and in some sections further west caused the apples to mature earlier than usual and drop badly.

The crop of pears was only a medium one and the fruit rather undersized. Peaches were a good crop and while they ripened rapidly and required to be handled quickly the prices obtained were very satisfactory. The plum crop was a light one on the whole. There was a good crop of cherries in Western Ontario and good prices were obtained for the fruit. There were practically no cherries in Eastern Ontario and Quebec. The grape crop was a medium one in the grape districts but the fruit suffered considerably from dry weather in September.

The crop of strawberries and bush fruits was only a medium one in Western Ontario, although there were some good crops. In Northern and Eastern Ontario and the province of Quebec, strawberries suffered badly from winter killing and the crop on the whole was very light. Raspberries were considerably injured by winter also, but there was a partial crop.

At the Experimental Farm the crop of summer and fall apples was a medium one, but there was very little winter fruit. The European plum crop was a failure, but the crop of American plums while not as good as usual was a fair one, although the drought caused the fruit to be rather small. There were practically no cherries. A few varieties of Russian pears had a light to medium crop. The strawberry crop was a total failure due to winter killing of the plants. The raspberry crop was below medium, but a fair amount of fruit was obtained. Blackberries were not as much injured by winter as usual and in the early part of the summer promised a good crop, but the extremely dry weather prevented the fruit developing and the crop was light. The crop of black, red and white currants was good. Gooseberries were medium to light.

Vegetables suffered much from the dry, hot weather and were below the average in Ontario and Quebec. The yield of tomatoes was below the average.

At the Experimental Farm the crop suffered considerably also, but the vegetables were not injured so much in the sandy loam soil which was kept loose, as in the clay ground of some commercial growers.

MEETINGS ATTENDED AND PLACES VISITED.

Following are the meetings attended and places visited during the year, with titles of addresses, where given:—

Canadian Seed Growers' Association, Ottawa, June 27 and 28, 1906. Address: 'Improvement of the Potato.'

Summer meeting of the Quebec Pomological Society, Chateauguay Basin, Que., August 29; Como. August 30, 1906. Address: 'Conclusions on Hardiness of Fruits After Nineteen Years' Experience at Ottawa.'

Annual meeting of the Ontario Fruit Growers' Association, Toronto, November 7 and 8, 1906. Address: 'Protecting Trees from Mice and Rabbits.'

Annual meeting of the Nova Scotia Fruit Growers' Association, Wolfville, N.S., December 12, 13, 14, 1906. Address: 'Orchard Management.'

Annual meeting of the Quebec Pomological Society, Knowlton, Que., December 20 and 21, 1906. Address: 'Growing Grapes for Home Use.'

Annual meeting of the Canadian Forestry Association, Ottawa, March 14 and 15, 1907. Address: 'Some Questions Relating to the Establishment, Maintenance, and Improvement of Farm Forestry.'

The Canadian National Exhibition was attended at Toronto during the second week of September, 1906, for the purpose of studying the horticultural exhibits there. During the same week a trip was made through the fruit district between Hamilton and St. Catharines. Several fruit farms were visited and notes taken of the condition of the orchards and fruit in order to learn in what way we could best help the fruit growers. While at St. Catharines, I took the opportunity of learning as much as possible regarding the methods adopted there of shipping fruit to the Northwest as many carloads were shipped from that point last summer.

At the Dominion Exhibition held at Halifax, N.S., from September 22 to October 5, 1906, I had charge of the exhibit from the Dominion experimental farms and believe that we had a very creditable display. While in Nova Scotia I drove from Middleton to Wolfville, a distance of about forty-two miles, through the Annapolis valley, visiting on the way a number of orchards and learning what I could regarding methods of culture and packing and shipping of the fruit. The cranberry bogs at Auburn were also examined and useful information obtained.

ACKNOWLEDGMENTS.

It gives me much pleasure to acknowledge again the services of those who share with me the responsibility of the Horticultural Division. Mr. J. F. Watson continues to help me in the office work, which he does with much care and accuracy. In the field Mr. H. Holz, foreman of the division, has as in the past done his work well. He is assisted by Mr. F. Horn, foreman in the Arboretum and Botanic Garden and Mr. Horace Reid who records the experiments in progress and takes many of the field notes, both of whom have shown much interest and care in their work.

The fruit growers in Canada and the United States continue to assist me in obtaining information and in other ways, which has been a great help to me in my work. I again take this annual opportunity of expressing my appreciation of their sympathy and aid.

DONATIONS.

Interest in the work of the Horticultural Division is shown each year by many who send plants, scions or seeds for test at the Experimental Farm. A public acknowledgment of those which were received since the report for 1905 was published up to December 31, 1906, is made here.

Donations.	Sender.
Wm. Sangster, Upper Falmouth, N.S.	Scions of seedling apple.
Henry Wilmot, Oromocto, N.B.	Scions of Belmont seedling apple.
Charles B. Camp, Cheney, Neb., U.S.	Grape vines, eight varieties.
Heber Rawlings, Forest, Ont.	Seedling potatoes.
W. H. Dempsey, Trenton, Ont.	Scions of Coo's River Beauty apple.
Wm. Wilson, Port Arthur, Ont.	King Edward potato.
Stanislas Lachance, D'Artagnon, Que	'Soleil Levant' potato.
S. Short, Ottawa	Plants of Cuthbert raspberry.
Geo. F. Bonewell, North Augusta, Ont.	Wortley potato.
Fred Foyston, Minesing, Ont	Early Harvester potato.
J. F. Morrow, Calumet, Que	Scions of Tom seedling apple.
C. Scott, Melville Cross, Ont	Magyar potato.
Lieut.-Col. Wm. White, Ottawa	Scions unknown apple.
Dr. Coughlan, Hastings, Ont.	Scions of seedling apple.
A. A. Evans, Kingsey, Que	Scions of late keeping Fameuse seedling.
A. Mosely, London, Eng	Scions of Fearn's Pippin apple.
Jules Lagace, Fraserville, Que	Scions Grand St. Jean apple.
J. C. Gilman, Fredericton, N.B.	Scions of unknown apple.
Wm. Pratt, Penetanguishene, Ont	Scions of No. 1 and No. 2 seedling apples.
Robert Hamilton, Grenville, Que	Apple scions and seed of Volga pear.
R. A. Marrison, Cataraqui, Ont	Scions of Phenomenal crab.
John C. Hodgson, Westmount, Que	Seeds of Italian pine.
M. Pettit, Winona, Ont	Cuttings of Early Dawn and Black Delaware grapes.
G. S. Hoyt, Lequille, N.S.	Seeds of Improved Swede turnip.
M. G. Clark, Nanaimo, B.C.	Tubers of Apex potato.
A. Lalonde, Isle Perrot, Que	Scions of La Salle and Highly Coloured Pewaukee apples.
F. W. Wilson, Port Hope, Ont.	Scions of Choate apple.
O. F. Brand & Son, Faribault, Minn., U.S	Scions of Estelline apple.
E. Loranger, Ste. Anne de la Perade, Que	Cherry scions.
Wm. Tucker, Halifax, N.S.	Geraniums.
Iowa Experiment Station, Ames, Ia., U.S.	Scions of Bestovall and Atkins plums.
Sutton & Sons, Reading, England	Twenty lots of potatoes.
A. H. Stead, Tapley's Mills, N.B.	Scions of seedling pear.
A. H. McRae, Pownal, P.E.I	Scions of Dodd apple.
Ontario Agricultural College, Guelph, Ont	Plants of eighteen varieties of strawberries.
L. A. Clemons, Storm Lake, Ia., U.S.	Scions of Clemons apple.
Miss Maggie McLaurin, Dalkeith, Ont,	Scions of Craignaivie apple.
Malcolm Macleod, Big Intervale, N.S.	Tubers of Shoat potato.
W. H. Brand, Jordan Station, Ont	Two cans Target Brand Scale Destroyer.
J. G. Webster, Hedley, B.C.	Potatoes.
J. A. Wright, Melboro, Que.	Scions of seedling apple.
S. B. Chute, Berwick, N.S	Scions of Crimson Beauty apple.
G. M. Bonmarvel, Sintaluta, Sask	Tubers of Sausisse potato.
John C. Walker, Holland, Man	Maple Leaf potato.
D. W. Buchanan, St. Charles, Man	Plants of Dr. Reider raspberry.
C. H. Snow, Cummings Bridge, Ont	Twenty-five plants Daisy strawberry.
H. N. Antisdel, Milford, Ia., U.S	Two trees Okoboji apple.
Messrs. Smith Bros., Beachville, Ont.	1 lb. 9 ozs. Eldorado potato.
E. Chegrion, St. Laurent, Manitoba	Uruguay potato.
R. Gammon, Lachine Locks, Que	Sutton's Prolific potato.
Wallace Machinery Co., Champaign, Ill., U.S.	New and Improved parts for Wallace Power Sprayer.
Spencer Seedless Apple Co., Toronto, Ont	Two trees of Spencer seedless apple.
James P. Wood, Stratford, Ont	Seeds of Columbine.
W. Atlee Burpee Co., Philadelphia	Vegetable seeds.
Wm. Rennie Co., Toronto, Ont.	Vegetable seeds.
B. G. Thoralson, Pine Valley, Man	Unknown potato.
Geo. Boulet, Normandin, Que	Tubers of unnamed potato.
Wesley Barkley, Chesterfield, Ont	Seedling potato.
J. P. Helm, Tignish, N.S	Blue Prolific potato.
John Hicks, Belleville, Ont	Hicks' Jubilee potato.
A. Smith, Ladners, B.C.	Sutton's Reliance potato.
W. J. Dickson, Springhill, N.S	Immigrant potato.
Jas. W. Stairs, Halifax, N.S	Seedling potato.
W. L. Scott, Ottawa, Ont.	Scions of unknown apple.
R. B. Whyte, Ottawa, Ont.	Scions of Wolf River apple.
T. Harris, Bayview, Ont	Scions of unknown apple.

SEEDLING FRUITS RECEIVED FOR EXAMINATION—1906.

A considerable number of seedling fruits was received for examination in 1906, as in previous years, and it was with much interest and pleasure that these fruits were tested and described. A large proportion of them, it is true, were not as good as named varieties on the market, but a few of them give promise of being useful. Full descriptions are given of those which are thought to be the most promising, while briefer notes are published of those which were not considered of special merit. The full descriptions follow the table.

It is hoped that fruit growers will continue to send specimens of promising fruits to the horticulturist, whether they are seedlings or merely unknown varieties. There are many desirable seedlings fruiting in different parts of Canada of which nearly 100 of apples alone have been collected from various sources and are growing at the Central Experimental Farm, Ottawa, where they are compared with other named sorts and a fair estimate obtained of their relative merits.

Record Number.	Province.	Name and Address of Grower or Sender.	Description of Fruit.
346	Nova Scotia	Wm. Sangster, Falmouth	See full description.
347	"	C. E. Starr, Perraux	Medium size, oblong, yellow, well splashed and washed with crimson. Season evidently early winter or late fall. Not promising.
348	"	W. H. Woodworth, South Berwick.	Appears to be identical with Yellow Bellflower.
349	New Brunswick.	A. H. Stead, Tapley's Mills.	Supposed seedling of Duchess. Below medium size, roundish, pale yellow, splashed and washed with bright red mostly on sunny side; briskly subacid; medium quality. Season probably November. Not promising.
350	"	"	See full description (pear).
351	"	C. N. Vroom, St. Stephen.	Above medium size, roundish to oblate; pale yellow with a pink blush; subacid; good quality; season October. Being the same season as Wealthy it is not desirable.
352	Quebec	A. E. Evans, Kingsey	See full description.
353	"	R. Hamilton, Grenville.	Pitcairn seedling. Above medium to large, oblate conic; pale greenish yellow well washed and splashed with deep crimson; briskly subacid, astringent; quality medium to above medium; season early to midwinter. Not sufficiently promising.
354	"	"	'Holdfast.' See full description.
355	"	"	'A. McMillan's Seedling.' Medium size, oblate; pale green, splashed and washed with deep, rather dull crimson; acid; medium quality; season evidently mid to late winter. Not promising.
356	"	"	Seedling 'Like La Salle.' Above medium in size, oblong, conical; pale greenish yellow, splashed lightly with crimson on sunny side; acid; medium to above medium in quality; season evidently midwinter. Not promising either in appearance or quality.
357	"	"	'St. Hilaire Seedling.' Above medium in size, oblate, angular, flattened; greenish yellow well washed with deep red; sub-acid; quality medium; season evidently early to mid winter or perhaps later. Not promising.
358	"	"	'R. Beauchamp's Seedling.' Medium in size, roundish; pale green washed with dark red on sunny side; briskly subacid, of pleasant flavour and above medium in quality. Season midwinter or later. Not sufficiently promising.
359	"	"	Above medium in size, oblate, flattened; yellow washed with dull purplish red on sunny side; briskly subacid; medium quality; season evidently midwinter or later. Not sufficiently promising.
360	"	"	'From near Pig Pen.' Medium to above medium in size, roundish, yellow with a pink blush; subacid with a pleasant flavour; quality good; season early winter. Past best condition.

Record Number.	Province.	Name and Address of Grower or Sender.	Description of Fruit.
361	Quebec......	R. Hamilton, Grenville..	'Knoll Seedling.' Above medium in size, roundish; pale yellow; mildly subacid and of pleasant flavour; quality good; season evidently early to midwinter. Would be promising if of a more attractive colour.
362	"	" ..	'St. Jane.' Medium in size, roundish; pale yellow well washed with crimson; subacid; quality probably good; season early winter. Too much past best condition to judge fairly of merits.
363	"	" ..	'Welden's Red Seedling.' Northwest Angle. Medium in size, oblate, conic; greenish yellow well washed with deep red; subacid; quality medium; season probably mid to late winter.
364	"	" ..	'X Calf Pasture—French Crab Stock.' See full description.
365	"	" ..	'Entrance.' Medium in size, oblate; rich yellow with an orange blush; acid; astringent; quality below medium; season October. Of no value unless as a cider apple. From French crab stock.
366	"	" ..	'Entrance'—French Crab Stock:—Medium in size, oblate, conic; pale greenish yellow splashed with bright purplish red on sunny side; subacid, little flavour; medium in quality, season probably early to midwinter. Not promising.
367	"	" ..	'Knoll from French Crab Stock.'—Medium in size, roundish, conical, yellow well washed and splashed with deep red; briskly subacid, little flavour; quality medium; season probably early to midwinter. Not promising.
368	"	J. F. Morrow, Calumet .	Medium in size, roundish, slightly angular; yellow washed on sunny side with deep, dull red with purplish red splashes; mildly subacid, pleasant flavour and above medium in quality. Season mid to late winter. Not quite good enough in quality.
369	"	J. F. Prudhomme, St. Philomêne.	Below medium in size, roundish, slightly angular; greenish yellow well washed and splashed with dull red; quality above medium; season probably early to midwinter. Not sufficiently promising.
370	"	" ..	Medium in size, oblate, conic; yellow splashed and washed with crimson mostly on sunny side; subacid; quality above medium; season evidently early to midwinter. Not sufficiently promising.
371	"	Peter Reid, Chateauguay Basin.	'Sport of Duchess' now called 'Reid.' See full description.
372	"	James Wright, Melboro.	See full description.
373	Ontario....	A. R. Surtees, Wendover	'Seedling No. 3.'—Medium in size, oblate, pale yellow with a pink blush; subacid; medium in quality; season probably December. Not sufficiently promising.
374	"	" ..	'Seedling No. 9.'—Too far gone to describe.
375	"	" ..	'Seedling No. 12.'—Medium in size, roundish to oblate, pale greenish yellow splashed with dull purplish red; briskly subacid: quality medium; season October. Not promising.
376	"	" ..	'Seedling No. 16.'—See full description.
377	"	" ..	'Seedling No. 20.'—Below medium in size, roundish; pale yellow with a pink blush; subacid with a pleasant flavour; quality above medium; season October, Not sufficiently promising.
378	"	" ..	'Seedling No. 23.'—Above medium in size, roundish, conical; pale green splashed and washed mostly on sunny side with dull red; subacid; quality above medium; season October. Not nearly as good as Wealthy.
379	"	" ..	'Seedling No. 31.'—Medium in size, roundish; yellow with a pink blush; subacid with a pleasant flavour; quality above medium; season October. Not promising.
380	"	" ..	'Seedling No. 32.'—Medium in size, oblate; yellow splashed and washed with purplish red; briskly subacid; quality medium; season October and later.
381	"	" ..	'Seedling No. 33.'—Above medium in size, oblate; pale green splashed and washed with dull red; subacid; quality medium; season probably October. Not promising.

Record Number.	Province.	Name and Address of Grower or Sender.	Description of Fruit.
382	Ontario....	J. Hawkins, Ojibwa ...	See full description.
383	"	J. McMullen, Cummings' Bridge.	Medium in size, conical; pale yellow; subacid with no decided flavour; quality medium; season evidently late September. Not promising.
384	" ...	Thos. Paddon, Toronto..	Medium in size, roundish, angular; green with a bronze or pinkish blush; subacid, pleasant; quality almost good; season probably October. Not sufficiently promising.
385	"	J. S. Reeson, Carterton.	Medium in size, roundish, conical; yellow with a red blush on sunny side: mildly subacid, pleasant flavour; quality almost good; season late winter. May be useful in the North.
386	"	Richard Shillington, City View.	Above medium in size, oblate; pale green splashed with dull red, mostly on sunny side; sweet with a pleasant flavour; quality above medium; season evidently mid to late winter. A good keeping sweet apple.
387	"	C. L. Stephens, Orillia ..	'No. 1.'—Medium in size, oblate; greenish yellow with a pink blush on sunny side; briskly subacid with a pleasant but not high flavour; quality above medium to good; season evidently late winter. Not sufficiently attractive in appearance.
388	"	"	'No, 2.'—Medium in size, roundish; greenish yellow with a bronzy pink blush; subacid, sprightly with a pleasant but not high flavour; season evidently late winter. Not sufficiently attractive in appearance.
389	"	"	Above medium in size, oblate; yellow, well splashed and washed with deep crimson; briskly subacid; medium in quality. Said to be a little earlier in season than Duchess. Not good enough in quality. Resembles Duchess in outward appearance.
390	" ...	"	Crab Apple Seedling. See full description.
391	" ...	Geo. Wilkinson, Parry Sound.	Medium in size, roundish; yellowish green; splashed and washed with dull orange red; mildly subacid, pleasant; quality above medium to good. Season probably early winter. Not attractive in appearance; not sufficiently good in quality.
39	"	F. W. Wilson, Port Hope.	'Choate.'—See full description.

APPLES.

No. 346. Falmouth Seedling, from Wm. Sangster, Falmouth, N.S.—Medium in size, oblate to roundish, flattened at ends; cavity deep, open, russeted; stem short, moderately stout; basin deep, open, slightly wrinkled; stem short, moderately stout; calyx partly open; colour yellow, well washed with bright and deep crimson; dots moderately numerous, yellow, distinct; skin moderately thick, tender; flesh yellowish tinged with red, crisp, moderately juicy; core medium; subacid, pleasant flavour; good quality; season evidently early to mid winter.

Suggestive of King. Rather promising.

No. 352. Evans, A. E. Kingsey, Que.—Late Keeping Fameuse like Seedling.—Below medium in size, oblate conic; cavity medium depth and width; stem medium length, slender; basin narrow, shallow, almost smooth; calyx closed; yellow well washed with crimson with darker splashes; dots few, yellow, distinct; skin moderately thick, tough; flesh white, tinged with yellow, juicy; core medium; subacid, pleasant but not of high flavour; good quality; season early to late winter.

Said to keep until spring. Not as good as Fameuse in quality, but if hardy may be desirable.

No. 354. Holdfast.—Medium size, roundish; cavity deep, medium width; stem short, slender; basin deep, medium width, smooth; calyx closed; pale yellow splashed and washed with bright crimson; dots few, yellow, indistinct; skin moderately thick, tough; flesh dull white, tender, juicy; core medium; subacid, pleasant flavour; quality good; season mid to late winter.

May prove useful. Apples hang well on tree.

No. 364. Hamilton, R.,—Seedling from 'X Calf Pasture—French Crab Stock.'—Above medium in size, oblong, conical; cavity narrow, medium depth; stem medium length, slender; basin medium depth and width, wrinkled; calyx open; pale yellow, splashed and washed with red; dots fairly numerous, white, distinct; skin thick, moderately tender; flesh white, firm, juicy; core medium; sweet, pleasant flavour; quality good for a sweet apple; season mid October, probably through November.

May be a useful sweet apple.

No. 371. Reid—from Peter Reid, Chateauguay Basin, Que.—Fruit large, oblate, angular, flattened at each end; cavity deep, open; stem short, stout; basin very deep, open, almost smooth; calyx open; colour pale greenish yellow, well washed on about ¾ of skin with deep red, somewhat orange red, with darker splashes; dots moderately numerous, small, white, distinct; skin thick, tough; flesh dull white, rather coarse, juicy, tender; crisp; core small; briskly subacid, pleasant flavour; quality above medium to good; season midwinter.

Much like Milwaukee. Said to be a sport on a Duchess tree, two branches of which were budded with McIntosh Red four years ago.

No. 372. Wright, Jas., Melboro, Que.—Seedling from.—Fruit above medium size, oblate, angular; cavity deep, medium width, russeted; stem (gone); basin medium depth and width, almost smooth; calyx open; colour greenish yellow; dots numerous, grey, distinct; skin moderately thick, moderately tender; flesh yellow, crisp, juicy, tender, breaking; core small; subacid, pleasant flavour; quality good to very good; season early to mid winter, evidently.

Somewhat like Grimes Golden in appearance and quality, but evidently not that variety.

No. 376. Wilson, A. E., Clarence, Ont.—Seedling No. 16 from; grown by A. R. Surtees, Wendover, Ont.—Above medium to large; roundish; cavity medium depth and width; stem short, stout; basin medium depth and width, almost smooth; calyx open; pale yellow, well splashed and washed with deep purplish red; dots obscure; skin moderately thick, tender; flesh white, tinged with red to near core; core medium; subacid, pleasant flavour; quality good; season October.

The most promising of Surtees' seedlings. A nice dessert apple.

No. 382. Hawkins, J., Ojibwa (Windsor), Ont.—Seedling from.—Above medium in size, roundish angular, flattened somewhat at both ends; cavity deep, open; stem short, slender; basin deep, open, smooth; calyx probably open; pale yellow, well washed and splashed with bright red; dots few, grey, indistinct; skin thick, moderately tender; flesh white, crisp, has some Fameuse characters, somewhat coarse, juicy; core medium; subacid, pleasant but not high flavoured; above medium to good in quality; season evidently October and later.

Seed brought from Quebec by a Frenchman.—Tree bears every year. Is about 15 years old. A very handsome apple. If better in quality would be quite promising.

No. 390. Stephens, C. L., Orillia, Ont.—Seedling from.—One and seven-eighths inches in diameter, about the size of Martha, but flatter; oblate, flattened; cavity open, medium depth; stem long, slender; basin open, medium depth; calyx closed; colour pale yellow washed with bright red on sunny side; dots purplish red on red side, indistinct on yellow side; skin thin, tender; flesh white, tender, breaking, juicy; core medium; subacid, pleasant flavour; quality good; season early September.

A good crab. About the same season as Martha, and compares favourably with that variety in quality.

No. 392. Wilson, F. W., Port Hope, Ont.—Seedling from, called 'Cheate.'—Medium to above in size, oblate; cavity deep, open; stem short, moderately stout to slender; basin medium depth and width, slightly wrinkled; calyx closed; pale yellowish green, well washed with deep red and splashed with darker shades; dots obscure; skin thick, tough; flesh white, tender, breaking, juicy; core small; subacid, pleasant flavour; quality very good; season evidently early to late winter.

Said to be a seedling. Very similar to Shiawassee Beauty.

PEAR.

No. 393. Stead, A. H., Tapley's Mills, N.B.—Seedling from.—Below medium in size, oblong, obovate, pyriform; cavity shallow; stem long, stout; basin deep, medium width, russeted; calyx partly open; yellow with an orange red blush on sunny side; dots numerous, orange red, distinct; skin thin, tender; flesh yellowish, tender, buttery but gritty about core, juicy; core small; sweet, good flavour, quality good; season evidently mid October.

Said to be a seedling of Bartlett and perfectly hardy and free from blight. Desirable in northern districts if hardier than Bartlett. Much like Bartlett in flavour, but not so good in quality. Has a trace of astringency about flesh.

APPLES ORIGINATED IN THE HORTICULTURAL DEPARTMENT, CENTRAL EXPERIMENTAL FARM, OTTAWA.

Since the year 1897 seedling apples have been fruiting at the Central Experimental Farm from seed sown there. The first seedlings which fruited were of Russian origin, the seed having been imported from North of Riga in Russia. The seedlings which were grown at Ottawa were planted out in 1890 to the number of 3,000. These began to fruit in 1897. Most of the trees proved very hardy, but while the fruit of a large proportion of the trees was as good as many of the named Russian apples which were introduced into Canada, very few of them were considered superior. The 3,000 trees were gradually reduced to 75. These seventy-five varieties were retained so that most of them might be tested in the prairie provinces on account of their apparent hardiness and good size, and 59 of them have been considered sufficiently promising to name. Only four of these compare favourably with the best named varieties of their season here. There are a few others which may be found of sufficient value for the east after a few more years test.

In 1898 seed was saved of some of the best varieties of apples which fruited at Ottawa that year, including St. Lawrence, Wealthy, McIntosh, Shiawassee, Fameuse, Swayzie, Scott's Winter, Winter St. Lawrence, Northern Spy, American Golden Russet, and several others. The seedlings of these and others which were sown later have been planted out at different times since 1901, until now, there are about 2,000 trees. The first tree to fruit was a Wealthy seedling now called Crusoe, which fruited in 1903, two years after planting and five years from seed. This variety fruited again in 1904, and it was not until 1905 that any other of the seedlings began to fruit. Owing to its many good points as an early apple the Crusoe was named and described.

In 1906 there were 105 seedlings fruited, of this lot of seedlings consisting of 47 Wealthy, 22 Swayzie, 6 Winter St. Lawrence, 6 Scott's Winter, 4 Salome, 4 McIntosh, 2 Fameuse, 7 Lawver, 4 Gano, 2 Shiawassee, 1 Langford Beauty. Out of this number, no less than 29 were considered sufficiently promising to propagate with a view of having a supply of trees should the future behaviour of these trees confirm the first fruiting. The large proportion of promising seedlings is significant when compared with the small number from the Russian seedlings, but in the latter case hardiness was the principal characteristic sought for, while in the seedlings raised from seed of apples fruited at Ottawa, hardiness, season, appearance, and quality were all taken into consideration. While the male parents of these seedlings are not known positively, as they were pollenized naturally in the orchard, certain characteristics of a number of varieties which grew near the trees from which the seed was obtained are quite apparent in the seedlings. This is very marked in the Swayzie seedlings. A Baxter tree grew near the Swayzie in the orchard and this tree is, we believe, mainly responsible for the large size, high colour, with large dots, of quite a number of the Swayzie seedlings. It may be remarked here that a few of the Wealthy and Swayzie seedlings were very similar to the female parent, but there were more among the former than the latter.

It is believed that some of the varieties which fruited in 1906 have distinct advantages over some of the named sorts of the same season and if the proportion of good seedlings continues each year as it did in 1906, by the time the 2,000 seedlings have fruited there should be a large number from which to select that hardy winter apple of handsome appearance and good dessert quality which has long been sought for in the colder parts of Ontario, and Quebec.

The following seedlings and cross-bred apples are among the best which have fruited at the Central Experimental Farm. These were not named for the purpose of introducing them at present, but to make it easier to keep a record of their future behaviour. Among these varieties are four which were produced by Mr. John Craig, when horticulturist here, by crossing the McMahan with the Scott's Winter.

Adonis (Wealthy Seedling).—Medium in size, roundish regular; cavity deep, open; stem short, stout; basin deep, medium width to open, almost smooth; calyx open; pale greenish yellow well washed with bright crimson on sunny side; dots moderately numerous, white, distinct; skin thick, tough; flesh dull white, rather coarse, moderately juicy; core small; subacid, pleasant but not high flavoured; quality almost good to good; season late October, probably through November.

A handsome, symmetrical apple and probably a better keeper than Wealthy. Resembles Wealthy much in outward appearance and in character of flesh.

Claire (Russian Seedling).—Above medium to large, roundish to oblong, angular; cavity medium depth and width; stem medium length, stout; basin deep, medium width, slightly wrinkled; calyx open; pale yellow, splashed, streaked and washed with bright crimson; dots obscure; skin moderately thick, fairly tender; flesh white, crisp, juicy; core above medium; subacid, pleasant, agreeable flavour; quality good; season late September and perhaps later.

May be useful for coming in just before Wealthy. A handsome apple of good quality.

Congo (Lawver Seedling).—Above medium to large, oblate to roundish; cavity narrow, medium depth; stem medium length, moderately stout; basin deep, open, almost smooth; calyx open; pale green washed with crimson; dots moderately numerous, white, distinct; skin moderately thick, tender; flesh yellowish, crisp, tender, juicy; core medium; subacid, sprightly, pleasant flavour; quality good; season probably mid to late winter.

Quite promising. Resembles Lawver considerably in outward appearance. Seeds also are large and broad like Lawver.

Crusoe (Wealthy Seedling).—Medium size, roundish, slightly angular; cavity deep, moderately open; stem medium to long, moderately stout; basin medium depth and width, wrinkled; calyx closed; colour pale yellow well splashed and washed on sunny side with bright red; dots obscure; bloom slight; skin thick, moderately tough; flesh yellowish, sometimes with red near skin, tender, juicy; core medium; subacid, pleasant flavour; quality good; season almost same as Duchess.

A very early bearer. Promising on account of handsome appearance, early bearing and good quality.

Dorval (McMahan White, female, x Scott's Winter, male).—Above medium in size, roundish, obtusely conical, prominently angular; cavity deep, medium width, russeted; stem short, stout; basin deep, medium width, wrinkled; calyx open; colour yellow with a few splashes of pink about cavity; dots obscure; skin moderately thick, rather tough; flesh yellowish, tender, breaking, juicy; core medium; acid, pleasant but not high flavoured; quality above medium; season probably early to mid or late winter.

This is much like Scott's Winter in character of flesh and flavour. Should make an excellent cooking apple.

Galetta (Wealthy Seedling).—Above medium in size, roundish, flattened at both ends; cavity deep, open, slightly russeted; stem short, stout; basin deep, open, wrinkled; calyx closed or partly open; colour pale yellow, washed and splashed with red, with a suggestion of pink, mostly on sunny side; dots obscure; skin thick, moderately tough; flesh white, crisp, tender, juicy; core medium; subacid, pleasant flavour; quality good; season late August to early September. Promising. Of good quality. A good eating apple. Resembles Wealthy somewhat in outward appearance.

Mendel (Wealthy Seedling).—Medium to above medium in size, roundish, regular; cavity medium depth and width; stem short, slender; basin deep, medium width, slightly wrinkled; calyx closed or partly open; colour pale greenish yellow well washed with an attractive shade of crimson, sometimes with a line down the side as on Tolman; dots numerous, yellow, distinct; skin thick, moderately tough; flesh dull white, juicy; core medium; briskly subacid, pleasant flavour, sprightly; quality good; season evidently early to mid winter or later. Promising. Resembles Wealthy very much in outward appearance and in flavour.

Navan (Swayzie Seedling).—Medium in size, roundish, somewhat oblique; cavity deep, medium width; stem short, moderately stout; basin open, medium depth, wrinkled at base; calyx closed; colour yellow, well washed with bright crimson; dots obscure; skin moderately thick, tender; flesh dull white, firm, crisp, juicy; core medium; subacid, pleasant, raspberry-like flavour; quality good; season November and probably later.

May be a useful winter apple. Not like Swayzie in any marked degree.

Neville (Russian Seedling).—Large to above medium in size, roundish conical; cavity deep, medium width, russeted; stem short to medium, stout; basin medium depth and wrinkled slightly; calyx partly open; pale yellow, splashed and streaked mostly on sunny side with bright purplish red; dots obscure; skin moderately thick, fairly tender: flesh white, crisp, tender, juicy; core medium; subacid, pleasant flavour; quality good; season second to third week of August, between Yellow Transparent and Duchess. A promising early apple.

Noel (Wealthy Seedling).—Large, almost very large, oblate, conic; cavity deep, medium width, russeted; stem short, stout; basin deep, narrow, almost smooth; calyx closed; colour pale greenish yellow, well washed and splashed with crimson; dots obscure; skin thick, moderately tough; flesh white, sometimes tinged with red near skin, rather coarse, moderately juicy; core small; briskly subacid, sprightly; quality above medium; season probably October and November and through December.

Resembles Wealthy somewhat in appearance and quality, but not as good. A much better keeper than Wealthy.

Ottawa (Swayzie Seedling).—Fruit medium to above medium in size, oblong, conical, somewhat flattened at ends, slightly angular; cavity deep, rather open; stem medium length, slender; basin deep, open, wrinkled; calyx open; pale greenish yellow well washed and splashed with rich crimson; dots moderately numerous, white, distinct; skin moderately thick, tough; flesh dull white or yellowish, crisp, juicy; core medium; subacid, sprightly, spicy, high flavour; quality very good to best; season mid to late winter.

This is one of the best, if not the best, seedlings obtained so far. The flavour is somewhat between a King and an Esopus Spitzenburg.

Percival (Russian Seedling).—Large to very large, roundish conic; cavity deep, open, russeted; stem short, stout; basin deep, open, wrinkled; calyx open; colour pale greenish yellow, splashed and washed with light crimson on sunny side; dots few, yellow, distinct; skin thick, tough; flesh yellowish, crisp, tender, breaking; core medium; briskly subacid, good, high flavour; core medium; quality good to very good; season early September.

Quite promising. Should be a splendid cooking apple and a nice dessert apple though very large.

Petrel (Wealthy Seedling).—Medium in size, oblate to roundish, regular, symmetrical; cavity medium depth and width; stem short, stout; basin medium depth and width, slightly wrinkled or plaited; calyx closed or partly open; pale greenish yellow, well splashed and washed with crimson; dots moderately numerous, pale, distinct; skin thick, tough; flesh white, firm, crisp, juicy, inclined to watercore; core small; briskly subacid, pleasant but not highly flavoured; quality above medium to good; season late August to early September.

An attractive looking apple, much like Wealthy in outward appearance. Should ship well. Promises to be very productive.

Roberval (McMahan White, female, x Scott's Winter, male).—Fruit medium in size, oblate; cavity medium depth and width, russeted; stem short, stout; basin deep, medium width, wrinkled; calyx open or partly open; yellow, well washed with deep red and splashed with dark red; dots obscure; skin moderately thick, tender; flesh yellowish sometimes tinged with red near skin, tender, melting; core small; flavour briskly subacid, pleasant; quality above medium, almost good. Should keep to mid winter.

Resembles Scott's Winter outwardly very much, but is larger. Quality is better than Scott's Winter.

Rupert (Russian Seedling).—Above medium in size, oblate; cavity medium depth and width, russeted; stem short, stout; basin medium depth and width, wrinkled; calyx closed; pale greenish yellow, sometimes with a faint pink blush; dots numerous, green, indistinct; skin thick, tough; flesh white, juicy, tender; core medium; pleasant flavour, briskly subacid almost acid; quality above medium to good; season early August. As early or earlier than Tetofsky and much better in quality. Better in quality than Yellow Transparent. Inclined to water core.

Valois (McMahan White, female x Scott's Winter, male).—Above medium in size, oblate, conic, angular; cavity deep, narrow, russeted; stem short, stout; basin deep, medium width, wrinkled; calyx closed; pale yellow well washed with deep red; dots obscure; skin moderately thick, tender; flesh white, tinged with red, tender, juicy; core medium; briskly subacid, pleasant flavour; quality above medium. Season probably early to mid winter.

Considerably larger than Scott's Winter. May be useful. Resembles Scott's Winter considerably in outward appearance and in character of flesh.

Walton (McMahan White, female x Scott's Winter, male).—Fruit large, roundish, conical, slightly angular; calyx deep, narrow, russeted; stem short to medium, moderately stout; basin deep, medium width, wrinkled; calyx partly open; yellow, well washed and splashed with bright red. Whole surface has a somewhat mottled effect, attractive; dots obscure; skin moderately thick, rather tough; flesh white, with a yellow tinge, firm, moderately juicy; core small; briskly subacid, not high flavoured, quality medium to above medium; season probably November and December.

A handsome apple. Has indications of Scott's Winter blood in shape and colouring and mottled appearance of skin. Little indication of McMahan blood except in size and perhaps firmness of flesh.

The following names have been given to fifty-nine of the Russian seedlings originated at the Central Experimental Farm:—Arcola, Birtle, Bowie, Bolton, Beaver, Bomba, Bison, Carlyle, Claire, Carman, Cicero, Cecil, Carnie, Crescent, Cottage, Dauphin, Dewar, Earliana, Grenfell, Galena, Hanley, Hamlet, Harbinger, Jarvis, Jasper, Jacko, Lang, Leroy, Mentor, Melfort, Morden, Murillo, Morley, Neville, Nepigon, Osler, Otter, Percival, Pingree, Ponoka, Parma, Polaris, Rupert, Roslin,

Ramona, Rawdon, Selkirk, Snelling, Solina, Sorley, Sanford, Souris, Selwyn, Vesta, Virgil, Varna, Virden, Woburn, Wesley. Most of these are no better than, nor as good as, the best named varieties fruiting at Ottawa, but it is hoped that some of them will prove very hardy and be suitable for the colder districts of Canada. Four of these are described above, namely, the Claire, Neville, Rupert and Percival. The descriptions of the others have not yet been published.

CONCLUSIONS REACHED AFTER NINETEEN YEARS' EXPERIENCE AND SEARCH FOR A HARDY WINTER APPLE OF GOOD APPEARANCE AND BEST QUALITY.

The search for a hardy, productive winter apple of good colour and the best dessert quality is becoming an old story in the Northwestern States, in the north, central and eastern portions of the province of Ontario, throughout the province of Quebec, and over a large part of the province of New Brunswick. Over this immense territory the cry for many years has been for a long keeping apple which will compare favourably in all particulars with the best long keeping apples grown in the more favoured parts of the American continent. Why does this search still go on? Will the desired apple ever be found? Finally the attempts made to find it are the points which after nineteen years' experience in this work may be discussed at this time when the probabilities of soon obtaining such an apple seem bright.

From experience with over 3,000 species and varieties of trees and shrubs, exclusive of cultivated fruits, from many countries and climates, which are under our care and observation at the Central Experimental Farm, Ottawa, we have drawn the following conclusions, regarding hardiness of trees.

A tree or shrub which will withstand a test winter at Ottawa must be one which ripens its wood early.

Trees or shrubs which are native to places having a longer or much longer growing season than at Ottawa, grow longer than the native species or those from a somewhat similar climate to the native species, and when a test winter comes their wood is not sufficiently ripened, or winter resistant, and they are more or less injured or perish.

After seventeen years' observations of this large collection which has increased to over 3,000 species and varieties, it may be said that with scarcely an exception, and those doubtful ones, no apparent increase in hardiness has taken place in individual specimens. Plants which killed to the ground seventeen years ago, kill to the ground still. Those which killed to the snow line, kill to the snow line still. Those which are killed back one-half or merely a few inches at the tip do so still. Sometimes a tree will remain hardy for several years and then kill back to near the ground. It is possible that they are getting hardier very gradually, but if so this increasing hardiness is scarcely imperceptible so far.

Another observation regarding tender trees has been that after a season when the growth has been strong more injury is likely to occur than in a season when the growth is short.

Individual specimens of certain species have been found hardier than others. This has been particularly noticeable in the case of the Hardy Catalpa (*Catalpa big nonioides*) which, as a rule, kills back badly at Ottawa, but some individual trees have proven much hardier and bloom freely at Ottawa. The raising of seedlings from these tender species has not been carried on long enough to state positively from our own experience that hardier types will be produced in this way, but the history of such work makes us hopeful. Some favourable results have, however, already been obtained.

Let us now turn to the hardiness of apple trees, and we might include all other large fruits that have been tested at Ottawa. About 700 named varieties of apples have been tested.

It has been found that a far larger proportion of those which originated in the Eastern and Southwestern States are tenderer than those which originated in the Northeastern and Northwestern States and in Canada. The same may be said of Europe. The hardy varieties from Great Britain, France, and Germany are few compared with those from the colder parts of Russia. It may be safely stated that the hardiest apples are those which have originated in Russia. They are the hardiest survivors of the hundreds and thousands of varieties which have originated in Russia during the past centuries and have shown their ability to withstand the winters there as far North as latitude 55°, or further, in a continental climate. In America, and especially in the colder parts of the country, the origination of varieties has been more recent and we believe that it will be some time before such hardy large apples as Hibernal, Charlamoff, and Duchess will be obtained on this continent, although some quite hardy varieties have already been originated.

By again analysing the list of varieties tested, we find that the season of all the hardiest varieties is summer or autumn. The winter of 1903-4 was a very severe one in the province of Ontario, and in the orchards at the Central Experimental Farm 164 varieties were winter killed. An analysis of these varieties, a list of which was published in the annual report for 1904, shows that 130 of these were early winter and winter varieties, and 34 summer and autumn. We believe that this is sufficient evidence to prove that summer and autumn varieties are hardier than later keeping sorts.

Let us now consider the difference between a summer and a winter apple.

A summer apple is one which is ready for use in the summer; a winter apple is one which is not ready for use until winter. The season of the first is much shorter than the second, mainly, we believe, because it reaches maturity in a hotter time of the year than the others. Duchess and Wealthy apples will keep much longer on Prince Edward Island, where the climate is cooler and development slower, than they will at Ottawa. Winter apples will also keep better there than they will in those parts of Ontario where they succeed.

It has been frequently observed that apples which mature early and are in condition for eating in summer and autumn are grown on trees which ripen their wood early, and on the other hand an apple which is not ready for use until winter is usually grown on a tree which does not ripen its wood early. A fact which many have observed and which we believe is perfectly natural. The fruit of most varieties of winter apples has to be kept on the trees at Ottawa until there is danger of severe frost, in order to get the apples sufficiently mature that the flavour will develop and that there will be a fair colour. The wood of such trees is also equally slow in arriving at that stage of ripeness which will enable it to withstand the winter, as has been proven by the figures given above.

Some winter apples are hardier than others, but from our experience with a large number of varieties we are forced to conclude that unless the fruit of a variety reaches a certain stage of development or maturity every season a certain time before it has to be picked, owing to danger from severe frost, that variety is not a safe one to plant. What that stage of maturity is we cannot at present definitely say.

In brief, then, we believe that it is a physiological impossibility for the majority of winter apples which have yet been produced to prove hardy in the colder apple districts of Canada because the trees having originated where the season is longer, grow too late for our short season. Must we then conclude that the origination of a hardy winter apple for the north, of good colour, and the best dessert quality, is an impossibility? We believe not. Apples which will keep nearly all winter when grown in some districts are autumn apples elsewhere. Some of the hardy varieties of Russian apples which have been introduced are found to be much earlier in season in America than they are in Russia. We believe that the growing and ripening season in two countries, or districts, while about the same length of time, may vary sufficiently to cause a marked difference in the season of a variety. As an example, take again Prince Edward Island, where there is a late spring, but where severe frost does not come until late, as compared with the colder parts of Ontario, where the spring is early, but where fall frosts are early also. In order, then, to get an apple most suited to a district or climate and to get it of the season required, it must be originated in that climate. The work of originating apples has been comparatively recent in the colder parts of Eastern Canada and in the Northwestern States, and by far the largest majority of seedling apples of merit which have been produced are summer or autumn kinds. This we think is due to two principal causes. In the first place, because most of the seedlings have been raised from summer or autumn varieties, these being the hardiest, and we should naturally expect that most of such seedlings would be of the same season as their parents. In the second place, and on the other hand, seedlings have been raised from the best late keeping verieties, but which are not hardy enough to stand a test winter, and the seedlings from such trees have not, as a rule, proven hardy. We do not believe that because seedlings are raised in a climate with a short season that the largest proportion of them will prove early apples regardless of their ancestry. We believe that in most cases in the past the ancestry of the seedling varieties originated in the North has not been favourable to the production of hardy winter varieties. The importance of ancestry in the origination of a hardy winter apple is well illustrated, we think, in a number of cross-bred apples which have fruited at the Central Experimental Farm. Of a cross between Scott's Winter male and McMahan female made by Prof. John Craig, when horticulturist, 23 trees have fruited. None of these are earlier in season than McMahan and 14 of them are later keeping apples. Practically all of them have some visible resemblance to the parents and some are very similar to both parents. All withstood the test winter of 1903-4.

It is believed that the basis for the production of the desired winter apple for the north should be a variety or varieties which have withstood test winters in the north and are also the latest keepers of such varieties.

It has been already said that late keeping varieties mean late ripening of wood, hence tender trees, but such late keeping hardy varieties as have already been originated in the north are of a different class. They are varieties which, although they mature or are fit for use early in the winter, yet keep all winter with good care. The fact that they are fit for use early means that the wood has ripened comparatively early, and hence is able to withstand the cold. Pomologists are well aware that certain varieties of fruits which are ready for use at the same time as other varieties will keep much longer. It is to this class that the desired winter apple for the north will belong.

The following winter varieties originated in the north stood the test winter of 1903-4 at Ottawa and are just such apples as have been described.

Canada Baldwin, originated in the province of Quebec.
Winter Rose, originated in Dundas County, Ont.
Calumet, originated on Calumet Island, in the Ottawa river.
Baxter, originated near Brockville, Ont.
La Victoire, originated in the province of Quebec.
Stone, originated in Vermont.
Scott's Winter, originated in Vermont.
Milwaukee, originated in Wisconsin.

Other promising unnamed late keeping seedlings obtained from the colder parts of Canada and the United States are growing at Ottawa. None of the varieties above mentioned have all the desired points, but we consider the outlook very bright for the origination of a hardy, productive, long keeping variety of good colour and best dessert quality for the north.

EXPERIMENTAL SHIPMENT OF APPLES.

One shipment of 90 boxes of apples was made in 1906. It was consigned to Thos. Russell, Glasgow, Scotland, and went via ss. *Athenia,* Donaldson Line, sailing from

Montreal on August 30. There were 44 boxes of Duchess apples in this consignment and 46 boxes of Charlamoff apples. The apples were picked when well coloured but still firm. Two pickings were made so as to have them all in as good condition as possible, the first picked being kept in a cool place until the rest were picked. The apples were carefully packed in rows and tiers in the boxes. No packing material was used except a sheet of cardboard at the top and bottom of the boxes between the fruit and the wood.

In addition to learning how the summer apples would arrive and the price they would bring when carefully packed, it was designed to test the strength of thinner boards than are usually used in the east for the tops and bottoms of the boxes, $\frac{3}{16}$ inch white pine being used instead of $\frac{3}{8}$ inch. The thinner material has long been used in the Western States and in British Columbia, but the wood used there is much tougher. The advantage of using thin material is that the apples can be packed much tighter, as the thin board will bend without bruising the fruit much. In this consignment 23 boxes had thin, or $\frac{3}{16}$ inch tops and bottoms, and 43 had thin tops only, the rest had tops and bottoms of the usual thickness, $\frac{3}{8}$ inch. The tops and bottoms were fastened on with cleats, which are very necessary where thin boards are used.

The apples all sold at six shillings per box. Following is the account of sales:—

'GLASGOW, September 11, 1906.

Account sales of 90 boxes apples ex. steamer '*Athenia.*'

Sold by Thomas Russell, by order and for account of: Mr. W. T. Macoun, Ottawa.

Mark.	QUANTITY.	£	s.	d.	£	s.	d.
No. 1...	45 boxes Duchess at 6s.	13	10	0			
	45 boxes Charlamoff at 6s.	13	10	0			
					27	0	
	CHARGES.						
	Freight on goods (including cold storage)	7	0	8			
	River and Harbour dues, Master Porterage, landing, selecting, coopering, catalogues, advertising, cartage to warehouse, receiving and delivering	2	5	0			
	Commission and guarantee	1	7	0			
					10	12	8
	Net proceeds				16	7	4

The following letter was received from Mr. J. A. Findlay, Canadian Agent, Glasgow, Scotland, who was asked to report on the condition in which the fruit arrived:—

'GLASGOW, September 11, 1906.

W. T. MACOUN, Esq.,
Horticulturist,
Central Experimental Farm,
Ottawa.

DEAR SIR,—Yours of the 28th ultimo to hand on the 8th inst.

The boxes of apples you refer to were discharged yesterday from the *Athenia* and I watched them as they were being handled, and found all the boxes in excellent order, with no breakages in either of the styles of boxes, the fruit also appeared in satisfactory condition.

The fruit, in the boxes of $\frac{3}{16}$ of an inch tops and bottoms, and $\frac{3}{16}$ of an inch tops and $\frac{3}{8}$ of an inch bottoms was certainly more tightly packed than in the ordinary box.

A box of this weight with $\frac{3}{8}$ of an inch bottom and $\frac{3}{16}$ of an inch top would seem to be most serviceable as it permits of the fruit being more tightly packed and because of the heavier bottom would stand rougher handling in discharging than these received, there is meantime no great pressure here, and all fruit from cold storage in being discharged is loaded in wooden tubs or iron tubs raised by crane to the dock and thereby no pressure is brought to bear on fragile boxes. It sometimes happens, however, boxes of fruit are raised by crane in slings formed of chains or ropes and thereby more or less pressure is put on the boxes according to the number in the sling, and I fear had such a method of discharging been adopted in this case from the manner in which a few of the boxes with thin bottoms bulged, a knock or pressure would have resulted in breakage.

Trusting this information is satisfactory.

Yours faithfully,
(Sgd.) JAS. A. FINDLAY.'

From this one shipment it would appear that apples may be safely shipped in boxes with 3/16 inch top and bottom made of such material as can be obtained in the east, but further experience is necessary before recommending the general use of such material. By using thin tops only and bottoms of the usual thickness, apples may be packed tight and less risk be run.

THE SEEDLESS APPLE IN CANADA.

During the past three years considerable interest has been aroused in Canada in regard to seedless apples, and during 1906 a company was formed in Toronto to push the sale of one variety, the 'Spencer Seedless.' In view of this fact it seems desirable to publish in this Annual Report what we know in regard to seedless apples in Canada, and the 'Spencer Seedless' in particular.

The seedless apple is not a new thing, having been recorded by writers several hundred years ago. There are in Canada at the present time several varieties of seedless apples which originated in this country. A seedless apple was exhibited at the annual meeting of the Ontario Fruit Growers' Association, held at Brantford, Ont., on December 19, 1900. The following reference is made to it in the report of the Fruit Exhibit Committee, of which the writer was chairman:—

'A curiosity in the form of a seedless apple was shown by Mr. A. W. Whitney, Iroquois, Ont. The apple was quite normal in outward appearance and of good size. Mr. Whitney says that none of the apples contain seeds.'

This tree was reported by the owner, Mr. L. Cameron, Iroquois, Ont., to be both seedless and bloomless. Through Mr. A. D. Harkness, Irena, Ont., I obtained specimens of the flowers and on May 26, 1904, several clusters were received from him and the following description was made of them:—

'Apetalous apple blossoms, received from Mr. A. D. Harkness, Irena, Ont., from tree grown by Mr. L. Cameron, Iroquois, Ont. About one dozen flowers received May 26. Flowers in clusters averaging three flowers in each, calyx apparently very similar (these were not compared with the calyx of perfect flowers at the time) to that of ordinary flowers. Petals abortive, very small and hidden by the sepals. Flowers evidently all pistillate. Appear to be fifteen stigmas to each flower.' We visited Iroquois in August, 1904, and went to see the seedless apple tree which is in the garden or small orchard of Mr. Cameron. The tree was found in a very thrifty condition but with not a fruit on it. This lack of fruit was explained to my satisfaction by the fact that there were practically no apples in the orchard that year, hence the pistillate flowers could not be pollinated. Mr. Cameron informed me that it was a seedling tree about 10 years old and probably fruited for the first time in 1900, when the fruit was shown in Brantford. Mr. Cameron has this seedless apple top grafted on another variety in addition to the original tree. Buds were obtained from Mr. Cameron and trees of this variety are now growing at the Central Experimental Farm.

Efforts have been made to obtain fruit of the apple since that time, but without success.

In April, 1904, the following item appeared in the Prince Edward Island *Farmer*: 'In a recent issue of the *Farmer* we published the result of an experiment in apple growing by which a noted Colorado orchardist, after seven years of experimenting, had succeeded in producing a seedless apple (The Spencer Seedless). It was noted that the tree bearing this scientific wonder bears no blossoms and that the fruit resembles a navel orange. Last Saturday, to our surprise and pleasure, we received a box of seedless apples grown last year in the orchard of Mr. Hugh Ramsay, Port Hill, P.E.I., with the explanation that similar apples had been grown yearly on the same tree during the past thirty years. Examination shows that the apple is entirely solid, there are no seed chambers, nor any semblance of seed; it is well formed, richly flavoured, and a good winter keeper, the samples received being firm and fresh although stored in ordinary barrels. The tree bearing this peculiar variety was full grown and bearing heavily when Mr. Ramsay came into possession of his farm thirty years ago.'

After this article appeared we wrote to the Editor, and also to the owner of the fruit, asking for specimens, but unfortunately the best were gone, the specimen received being small and the quality, judging by the fruit tested, not more than medium. The core was small and was situated nearer the calyx than in ordinary varieties, the cartilagenous parts of the core, or carpels, were not as thick as in the varieties with seeds. There were no seeds in the specimen examined. I have tried to obtain fruit of this apple since, but without success.

When attending the annual meeting of the Prince Edward Island Fruit Growers' Association on December 20, and 21, 1904, a specimen was shown me of a seedless apple grown by Jesse A. Wright, North Bedeque, P.E.I. This apple was past best condition, but was seedless with a small core confined to the calyx end of the apple.

At the Flower, Fruit and Honey Show held in Toronto on November 6-10, 1906, a number of the Spencer Seedless apples were exhibited and agents were in attendance taking orders for trees of this fruit. The Spencer Seedless apple is said to have originated with Mr. J. F. Spencer, Grand Junction, Col., U.S.A., but it is believed by good authorities to have originated in Virginia as a chance seedling.

As trees of the Spencer Seedless apple were being offered at $2·50 per tree those attending the Ontario Fruit Growers' Association thought it would be in the interests of Canadian fruit growers to have an unbiased judgment on the merits of this fruit, hence a committee was appointed consisting of H. H. Groff, Simcoe, Chairman; D. Johnston, Forest; E. Morris, Fonthill; W. H. Dempsey, Trenton; and W. T. Macoun, Ottawa. This Committee reported as follows:—

'We secured specimens from the exhibit at Massey Hall, which showed the following objectionable characteristics in apparent contradiction to the printed description. Although the core is smaller and less distinct than in the average apple, there is still sufficient to make the process of coring a necessity. The practical absence of the calyx tube leaves an abnormally large and deep opening reaching to the core, thereby involving loss of flesh nearly equal to a normal core, as well as affording a harbour for injurious insect pests. The specimens examined by us showed this space to contain an objectionable mold-like accumulation. They also gave well developed seeds, though fewer than the normal apple. As to size, the specimens seen by us were about equal to our Fameuse, or Snow, and those tested for quality and flavour were about equal to Ben Davis. We believe that our inspection warrants the advice that trees of this apple should only be purchased as a curiosity.'

Having procured some specimens of the Spencer Seedless apple, I took a full description of the fruit on my return from Toronto.

The following is the description made:—

'Spencer Seedless Apple.—Medium in size; oblate to roundish, flattened at ends, somewhat angular; cavity deep, medium width, russeted; stem short, slender; basin very open, medium depth, slightly wrinkled with five fleshy, rounded masses where sepals or petals were; calyx absent, a wide opening extends to the core; colour greenish-yellow, well washed with orange red and splashed with purplish red, though not prominently; dots numerous, yellow, conspicuous; skin moderately thick, tender; flesh yellowish, firm, inclined to woody, moderately juicy; core small, closed. There are really two cores, one above the other; mildly subacid, little flavour; quality medium, about like Ben Davis; season probably mid to late winter.

Seeds are not always absent, from one to two being sometimes found. While the core is smaller than that of the average apple there is still enough to necessitate coring, and the open cavity having an unattractive mould-like accumulation necessitates cutting this part out, which would offset any saving in the size of the core.'

The Spencer Seedless Apple Company have sent two trees of this variety to be tested at the Central Experimental Farm.

Unless a seedless apple is as good or better than a McIntosh, Northern Spy, King, or Esopus Spitzenburg, it is of little practical value in my judgment, unless for evaporating or canning, and as so many culls and windfalls of well known varieties can be obtained for this purpose we do not believe that seedless apples unless of great merit will become popular or useful. It is possible that by crossing seedless apples with varieties of the best quality that something will be produced that will be of real commercial value.

PEARS.

The only pears that fruited in 1906 were three Russian varieties. None of these are, however, good enough to grow where fruit of the better kinds can be obtained at reasonable prices.

The Flemish Beauty is the hardiest good pear which has been tested and it is hoped that in the seedlings of this variety which have not yet fruited there will be some still hardier. There was practically no pear blight in 1906, and little winter killing.

PLUMS.

The crop of Americana and Nigra plums was below medium on the whole, and while some varieties fruited heavily the crops of others were quite light. The European plum crop was practically a failure. The unfavourable winter, dry weather in summer, Aphis, Shot-hole fungus, and Ripe Rot combined to reduce the crop.

Notwithstanding thorough spraying with kerosene emulsion twice, the aphis could not be completely controlled as the curling of the leaves prevented reaching them all. The Ripe Rot has been somewhat troublesome during the past few seasons causing considerable injury to Americana plums. All varieties are not equally affected, those with the tenderest skins suffering the most as a rule. The early varieties were but little, if any, affected. The trees were sprayed four times with Bordeaux mixture for the purpose of helping to keep this disease under control, but notwithstanding this thorough spraying some injury was done. Although the plum trees have been very thoroughly sprayed with Bordeaux mixture year after year, the Shot-hole fungus has not been entirely controlled by it. Some varieties are almost immune, while others are usually badly affected.

Two varieties of Americana plums highly spoken of elsewhere fruited this year, namely: U.S. and Brackett. These are fine large plums, but do not appear better than some already described. Following are descriptions made of them, also of two seedlings originated at the Central Experimental Farm and named during the past season, Lester and Troy:—

U.S.—Form roundish; large; cavity shallow, medium width; suture a distinct line; apex rounded; yellow almost entirely covered with deep purplish red; dots numerous, yellow, distinct; bloom moderate, bluish; skin thick, tough; flesh yellow, juicy; stone medium size, oval, cling; sweet, good flavour; quality good.

Of the same type as Oren and Bouncer, but not as good as either.

Brackett.—Form roundish, flattened at ends; large to very large; cavity medium width, shallow; stem ½ inch, slender; suture a distinct line, no depression; apex flattened, indented; colour yellow almost entirely overspread with deep purplish red; dots numerous, yellow, distinct; bloom moderate, bluish; skin thick, tough; flesh deep yellow, meaty, juicy; stone above medium, roundish, flattened, cling; sweet, rich, good flavour; quality good.

Of the same character as Oren and Bouncer. Does not appear better than either of them.

Lester—(De Soto Seedling).—Roundish, one side a little longer than other; medium to above medium in size; cavity narrow, shallow; suture a distinct line only; apex rounded; yellow more or less covered with bright red; dots moderately numerous, small, yellow, rather indistinct; bloom moderate, bluish; skin moderately thick, rather tough; flesh deep yellow, juicy; stone below medium size, semi-cling, roundish, considerably flattened; sweet, good flavour; quality good. Season mid September. Worth keeping on account of quality and productiveness. A promising plum.

Troy—(Cheney Seedling).—Roundish, large; cavity narrow, shallow; suture a fairly distinct line very slightly depressed; apex rounded; yellowish well washed with deep red; dots numerous, small, yellow, distinct; bloom moderate, bluish; skin rather thick, moderately tender; flesh deep yellow, juicy; stone above medium, oval, flattened; sweet, good flavour; quality good to very good. Season mid September.

A promising seedling, better in quality than Cheney.

CHERRIES.

The cherry crop was practically a total failure this year; the fruit buds, as is usually the case, being destroyed by winter. Each year's experience makes it more certain that until some hardier varieties are found the only method of producing cherries in this district is by protecting the trees or by growing dwarf trees which will be protected by the snow. Bushy trees of the Koslov Morello type are what are needed, but unfortunately these trees are extremly slow in growing when grafted and if stones are planted the fruit varies so much that one is uncertain what he will get when the trees begin to bear, which from the seed takes a long time also. The Orel 25 and Vladimir are two of the hardiest varieties which have been tested.

The black aphis and leaf spot were troublesome on the cherry trees this year.

GRAPES.

Although there was very little snow in the winter of 1905-6 and what there was disappeared early, the grape vines with the slight protection afforded them from cold by the few inches of soil thrown over them in the autumn came through the winter in good condition, showing clearly that the value of covering lay not so much in the protection from cold as from the sudden changes of temperature. The vines were not uncovered until May 18 and 19, it being learned by experience that it is very important to keep them covered as long as possible without danger of heating so that spring frosts will be avoided.

The season of 1906 was a very favourable one for grapes in the Ottawa valley, the hot, dry weather causing them to grow rapidly and ripen up their fruit well.

There were 100 named varieties ripened thoroughly. The twenty-five varieties which ripened first were: Florence, September 8; Janesville, Hartford, September 11; Jewel, Early Ohio, Early Daisy, Champion, September 12; Manito, Pattison, Bonne Madame, Moore's Early, Early Victor, Presley, September 15; Golden Drop, Moyer, Brant, Jessica, September 18; Campbell's Early, Potter, Lutie, Cottage, Rogers 17, September 20; Merrimac, Winchell, Canada, September 24.

Some very promising seedlings fruited this year.

During the past few years robins have been troublesome in the vineyard and are very destructive to the early varieties of grapes if left unprotected, hence it has become necessary to protect them. This is done by means of paper bags which are pinned over the bunches very rapidly and at comparatively little cost when the grapes are beginning to colour. The fruit does not ripen quite so early when covered as when left unprotected.

The vines were kept thoroughly sprayed in 1906 with Bordeaux mixture and there was little injury from disease.

BLACKBERRIES.

The blackberries wintered better than usual this year, which was somewhat unexpected considering the lack of snow last winter, but the wood was evidently better ripened than usual in the autumn of 1905. Early in the season the crop promised to be a good one, but the hot, dry weather prevented the development of the fruit and the crop was a light one. The Agawam is the most satisfactory blackberry tested here, Snyder coming next. The Eldorado is promising.

RASPBERRIES.

Notwithstanding the lack of snow in the winter of 1905-6, the raspberries came through the winter in fair condition, although there was some injury to the more tender varieties. The hot, dry weather was unfavourable to the production of much fruit, hence the crop was not a large one. A new plantation was made in the spring of 1906.

CURRANTS.

The red and white currants wintered well on the whole and there was a good crop of them. The Cherry, Versaillaise, Fay, Moore's Ruby, and Wilder, are distinctly more tender in fruit bud than most of the other sorts, and the crop of these was light this year.

The crop of black currants was good in some cases, but a number of the varieties were injured by winter, both in wood and fruit buds. The crop, on the whole, was not more than a medium one.

GOOSEBERRIES.

The gooseberry crop was a light one, the flowers having been apparently injured by spring frosts.

STRAWBERRIES.

The strawberry crop at the Experimental Farm, as throughout this district, was practically a total failure in 1906. The thawing and freezing of the ground during the winter of 1905-6 and the coating of ice which covered the strawberry plantation as it did the ground nearly everywhere on the Experimental Farm caused the death of nearly all the strawberry plants in a plantation containing over 200 named varieties, and 34 unnamed seedlings of great promise, which had been selected from a large number originated at the Experimental Farm. The strawberry plantation had been well mulched with marsh grass the previous autumn. It was impossible to obtain many of the varieties which were in the plantation from growers of strawberry plants as they are not now offered for sale. These varieties had been retained as they were found superior to many of the new kinds put on the market each year.

A new plantation was made in May, 1906. As some varieties stood the hardships of the winter of 1905-6 better than others, a list of those which appeared the hardiest is given as these should be among the most useful where the climate is severe.

LIST OF STRAWBERRIES WHICH CAME THROUGH THE WINTER OF 1905-6 IN THE BEST CONDITION.

Hardiest.—Beder Wood, Lovett, Senator Dunlap, Pocomoke, Crescent.

Probably almost or quite as hardy—conditions a little more favourable.—Bismark, Steven's Late Champion, Hawaii, Abington, Howard, Luxury, Hero, Sunshine, New Globe, Jucunda Improved, Giant, Armstrong, Uncle Jim, Giant Ruby, and Carleton.

In 1903, spring frosts did much damage in the strawberry plantation by injuring the flower buds and the yields that year were very small. Of the varieties which proved hardiest after the winter of 1905-6, the Jucunda Improved, Lovett, Crescent, and Beder Wood, appear in the list of the twenty-five which yielded best in 1903, showing that these are both hardy in flower and plant.

A NORTHERN EXPERIMENTAL ORCHARD.

In the annual reports of the Horticulturist for 1895 and 1899, there were published the results of experiments in fruit culture by Mr. J. C. Chapais, St. Denis, Kamouraska county, P.Q. It seems desirable to again publish an account of the orchard which will bring the results of the experiments up to date. These results were summed up by Mr. Chapais in the following paper which he presented before the Quebec Pomological Society recently.

'ORCHARD EXPERIMENTS IN EASTERN QUEBEC.

ANALYSIS OF A LECTURE DELIVERED BEFORE THE WINTER CONVENTION OF THE QUEBEC POMOLOGICAL SOCIETY, HELD AT KNOWLTON, BROME COUNTY, P.Q., ON DECEMBER 19 AND 20, 1906.

Twenty years ago, we undertook, in the province of Quebec, at St. Denis, Kamouraska county, P.Q., a locality situated 90 miles below the city of Quebec, on the St. Lawrence river, by 47° 30′ of latitude north, some experiments in small and large fruit growing. We give here a few particulars on the climate of that region and on the ground of our orchard.

Lowest temperature experienced in 43 years—34° F. below zero.

Highest temperature experienced in 43 years—96° F.

Average rainfall experienced in 43 years—28½ inches, including the winter snowfall, which gives an average of three feet deep in the open country.

Predominant winds are northeastern, saturated with salt emanations from Gulf of St. Lawrence.

The soil of the orchard, which is gently sloping to the north, is composed of sandy clay, naturally damp, but well drained. A wind-break of white-spruce shelters the orchard on the northeastern side.

At the time we began our experiments, we were growing a few seedling apple trees, the Blue Damson and Montmorency plums and the common or French cherry, but, practically, no grafted fruit trees of any kind. We have been trying, since, 51 varieties of apples, 9 of pears, 33 of plums, 13 of cherries, 12 of gooseberries, 10 of currants, 8 of raspberries and blackcaps and 7 of strawberries.

As to apples, we have picked out as good for cultivation in our district and having a real value, 22 varieties classified here after the results obtained with them:—

Summer apples.—Hare Pipka, Red Astrachan, Summer or Early Strawberry and Yellow Transparent.

Early fall apples.—Grandmother, Peach of Montreal, Transcendent and Whitney.

Late fall apples.—Alexander, Duchess of Oldenburg, Hyslop, Montreal Beauty, Wolf River, St. Lawrence and Titovka.

Early winter apples.—Fameuse, McIntosh Red, Wealthy and Winter St. Lawrence.

Late winter apples.—Ben Davis, English Golden Russet, Longfield.

Out of those 22 varieties of apples giving good crops of well matured fruit and being very hardy with us, we have made a selected list of the very best varieties, as being quite commendable. They are:—

Summer.—Hare Pipka, Summer or Early Strawberry

Early fall.—Grandmother, Whitney.

Late fall.—Duchess of Oldenburg, Titovka

Early winter.—Fameuse, Wealthy.

Late winter.—English Golden Russet, Longfield.

In pear culture, we have, since three years, after having discarded Russian varieties that have proved to give very poor fruit, had good success with the Flemish beauty and the Vermont Beauty. We entertain great hopes from four varieties bought in Belgium, coming from the Ardennes mountains, having wintered well since three years, including the very severe one of 1904, and having bloomed last spring.

Our experiments with plums have proved very interesting. Out of 33 varieties tested since twenty years we have still under cultivation 31 varieties, out of which the nineteen following are bearing and give us good crops of fine fruit. They are:—

Blue Damson,
Canada Orleans,
Coe's Golden Drop,
Early Yellow,
Grand Duke,
Gueii,
John Trotter,
Lombard,
Mirabelle,
Pond's Seedling,
Purple Gage,
Reine Claude de Bavay,
Reine Claude de Montmorency,
St. Cloud,
St. Denis Seedling,
Saunders,
Smith Orleans,
Unknown Seedling,
Yellow Damson.

From these we pick the following selected list of the very best ten varieties for us:—

Blue Damson,
Coe's Golden Drop,
Early Yellow,
Gueii,
Lombard,
Purple Gage,
Reine Claudé de Montmorency,
Saunders,
Smith Orleans,
St. Denis Seedling.

The ten varieties of plums just indicated give plums fit to eat from August 25 to November 10. We sold them, this year, 30 cents a gallon, taken by the buyer on the tree, without package.

We have made experiments with thirteen varieties of cherries; seven of them have proved to be very valuable. They are:—

French chérry, maturing from July 5 to 25.

Ostheim, Russian, maturing from July 10 to 25.

Empress Eugenie, maturing from July 15 to 31.

Montmorency, maturing from July 20 to August 5.

Bessarabian, Russian, maturing from the last days of July to the first days of August.

Lutovka, Russian, maturing from August 1 to 15.

Fouché Morello, maturing from August 10 to 31.

With those seven varieties, we can send cherries on the market from the second week of July to the last week of August.

Now, coming to the small fruits, we make our selected lists as follows:—

Gooseberries.—Out of twelve varieties we consider as the best: Columbus, Downing, Houghton, Pearl, Smith improved.

Currants.—Out of ten varieties, we have selected as the best: Champion, black; Fay's Prolific, red; Versaillaise, red; White Dutch.

Raspberries.—Out of eight varieties we have kept as very valuable: Antwerp red; Golden Queen, yellow; Marlboro, red; White raspberry, yellow.

No success to speak of with Black Cap raspberries and Blackberries.

Strawberries.—We intend to grow, of the seven varieties tested, the Lovett, Red Alpine, Red Bush Alpine, Sharpless, White Alpine, White Bush Alpine. We have discarded only the William Belt because it is infested with leaf rust.

We plant our apple trees 25 feet apart in the rows and 30 feet between the rows. This is contrary to all instructions generally given by orchardists. The reason, however, that has made us resort to that system, is that, under our severe climate, the trees must be planted close together, in order to offer protection the one to the other against the heavy damp winds prevailing in our region. We have found that, though in Essex county, Ontario, apple trees planted 40 feet apart, 20 years ago, intermingle their branches, in our district our apple trees planted 20 years ago, 25 feet apart only, don't yet intermingle their branches. This shows that there is a great difference in the growth caused by the difference of climate and that the reasons which are invoked necessitating a distance of 40 feet between apple trees, viz.: that when planted closer they soon intermingle their branches, prevent the fruit from getting enough air and light and are an obstacle to the cultivation and spraying of the orchard, don't exist in Eastern Quebec.

J. C. CHAPAIS.

FUNGOUS DISEASES AND SPRAYING.

Fungous diseases did considerable injury to fruit in 1906. The Apple Spot was not nearly so bad, however, as usual, doubtless owing to the dry season. The Sooty Fungus of the apple, a disease which has been more or less troublesome during the past five years, was somewhat worse than usual in 1906. This disease was not before noticed by the writer east of Toronto, but this year it was seen on a specimen grown at Lachine Locks, Que. The Dry Rot on summer apples was worse than usual. It has been observed that this disease or injury to the fruit is more pronounced in dry seasons. In the pear districts, particularly in the Niagara Peninsula, the Pear Blight did great harm, ruining many trees. No practical preventive or remedy has yet been discovered for this disease except cutting out the diseased branches. Peaches and plums did not suffer much from rot in 1906 in Western Ontario. At Ottawa there was considerable injury to Americana plums from Ripe Rot, notwithstanding thorough spraying. The Shot-hole Fungus affected some of the varieties of Americana plums and although the trees were sprayed constantly and thoroughly with Bordeaux mixture it was impossible to control it.

Grapes did not suffer much from mildew and rot in Western Ontario, although in individual cases the Black Rot did considerable injury. Where well sprayed with Bordeaux mixture, little injury was experienced. At Ottawa there was practically no disease on the grapes.

Among vegetables, the Tomato Rot did probably more harm than any other disease except the potato blight. In the Ottawa district tomatoes were badly affected but at the Experimental Farm thorough spraying with Bordeaux mixture prevented the spread of this disease and little harm was done by it. The Potato Blight was present as usual, but owing to the extremely dry season there was little rot.

PEAR BLIGHT. FIRE BLIGHT (*Bacillus amylovorus*).

The Pear Blight was more than usually destructive in the pear districts of Ontario in 1906, whole orchards being practically destroyed and many trees so badly affected that they are much disfigured by the disease and it will take some time before they have regained a symmetrical shape. The Pear Blight is a bacterial disease and is one of the most difficult to control. The only sure way of controlling it is to remove every diseased tree or branch from the orchard, and if the trunk is affected to remove all diseased parts. It will be readily seen that unless the work is done in a very thorough and systematic manner it is practically impossible to cope with the disease. As a general rule trees which are growing rapidly are worse affected, the sappy wood being very susceptible to the disease; hence any system of culture that will cause a healthy but not strong growth is to be preferred. It is rather difficult to grow good pears in sod in the pear districts, otherwise the orchards might be let grow in grass, which would check the growth and render the tree more immune. A better plan might be to loosen the ground in the spring by harrowing or cultivating and then seed it down to some cover crop, as by this plan sufficient growth might be made to ensure good sized fruit and the growth of the tree would be checked by the exhaustion of moisture by the growing cover crop. This disease has been known to injure fruit trees for more than one hundred years and it is likely to continue to do so, hence some method of growing the trees should be adopted which will as far as possible lessen the injury in addition to the method just pointed out. By training pear trees so that the top will be made up of several large branches in what is known as the vase form the chances of serious injury is lessened as one branch may be affected and not the others and if the diseased branch is removed the tree may be saved. If, however, the tree is of pyramidal shape and infection takes place in the leader the disease may run down the main trunk and the tree be destroyed. In addition to having a tree with a vase shaped or branching top it is important to keep suckers or water sprouts removed as these may carry infection to the main trunk and the tree be destroyed. Fruit spurs should not be left near the junction of the branches with the main trunk as if these are affected the disease may get to the main trunk.

Some varieties of pears are less subject to blight than others, among these are: Anjou, Kieffer, Seckel, Duchess, Winter Nelis, and Tyson, while the Bartlett and Clapp are two of those which are most subject to it. It may then be desirable to plant the varieties which are least subject to this disease. Another plan would be to top graft the more susceptible varieties on the more resistant kinds as the chances of the whole tree being destroyed would be considerably lessened. The Fire Blight which affects apple trees, is the same as this disease.

Spraying with Bordeaux mixture has no apparent effect upon it, but it is believed that the lime and sulphur wash forming a coating over the bark prevents to some extent the entrance of the blight germ.

The bacillus or germ of the Pear or Fire Blight finds its way into the tree at the tenderest and least protected points and it is believed by those who have made a careful study of it that practically all the infection is done by insects or birds and that the disease is not carried to any extent by wind. Insects carrying infection travel to the tips of succulent shoots and the germs find entrance through the buds at the axils of leaves, and at any point where the bark is broken. The chief sources of infection of bearing trees are through the flowers to which come insects bearing the germs.

The blight is usually first noticed in the spring on bearing trees when flowers and flower clusters which have been blighted wither and do not set fruit. Soon the fruit spurs are noticeably affected and also the new wood. The disease starting at the tip of the shoots usually runs down, although it will run in every direction, sometimes passing on to the main branches and to the trunk of the tree. The disease varies in the way it spreads. Sometimes only the flowers are affected or the fruit spurs or smaller twigs, or patches about a place on the branches or trunk that have some physiological injury. The germs are found in a gummy substance or exudation and this is carried by the insects from one flower or tree to another. These bacteria increase very rapidly by division and once the tree is infected the disease may soon spread over a large area. As has been stated, the best method known of controlling this blight is by cutting out the diseased parts. To do this thoroughly it is necessary to begin in the winter, going over the orchard several times to be sure that all the diseased wood has been observed. This should be followed up in spring and summer and everything showing a sign of the blight should be cut out not less than six inches below the affected part or into healthy wood. Where possible it is wise to cut as much as one foot below where there is evidence of the disease. It has been proved by experiment that infection is carried on the knife or saw, especially in summer, hence after each branch is cut the knife should be disinfected. The disinfectant recommended by Prof. M. B. Waite, who has given this disease very careful study and who is confident that it can be controlled by taking proper care in pruning and doing the work systematically and thoroughly, is 'A solution of corrosive sublimate in water, one part to one thousand. Tablets may be obtained from the drug store which are of convenient size for making the solution.' A sponge is carried with which to apply the disinfectant. Corrosive sublimate is a deadly poison, hence should be labelled 'Poison.' It should not be carried in a metal receptacle. The objection to a carbolic acid solution in water is that it must be made very strong to be effective.

A systematic effort is now being made in California to stamp out this disease which has recently gained a foothold there. The method adopted is to cut out affected branches and burn them. When the body of the tree is affected it is rooted out and burned.

Fruit growers in the pear districts of Canada should combine in an endeavour to control the blight. Individual efforts are of little avail if neighbouring orchards are neglected.

SOOTY OR FLY-SPECK FUNGUS.

(*Leptothyrium pomi.*)

This disease was much more troublesome than usual this year, and disfigured much fruit. It generally occurs in low-lying orchards, where the air is moister and is usually worst in damp seasons. This disease has been more or less troublesome in the New England States, it being particularly bad in 1896. In 1902 it caused considerable injury in Ontario, and in the annual report of the Central Experimental Farm for that year the writer gives a description of it and recommendations are made for its treatment. The disease is a low form of fungus, and is apparent as sooty or black, roundish patches on the apple, not unlike splashes of ink or soot. These patches often run together and affect a large area of the surface and make the fruit very unsightly. On these patches are frequently seen small black spots resembling fly specks, which are another form of the disease. As the Sooty Fungus grows over the surface of the skin, it is easily controlled if spraying is done at the right time. The disease develops in summer after the first three sprayings for the apple spot have been given, and it will require at least a fourth spraying to control this disease. An experiment was conducted at the New Hampshire experiment station a few years ago to control it on pears, the last spraying with Bordeaux mixture being given on July 26. Of the sprayed fruit 98·9 per cent was clean, and of the unsprayed only 1·3 per cent. Spraying the apples once when they are about the size of Transcendent crabs or larger should control this disease, and if apple trees are given a fourth spraying for the Apple Spot as is recommended, there should be no trouble with it. Unfortunately, the Sooty Fungus spreads in storage, and fruit that is little affected when it goes into storage may be considerably injured before the fruit is sold. Fruit affected with this disease is known as 'Clouded Fruit' in the trade. This disease is usually confined to the southwestern parts of Ontario, but this year the writer was shown an affected specimen from near Lachine Locks, Que.

The varieties usually most affected are the Greening and Northern Spy, but it also injures the Baldwin and other varieties.

BLACK ROT OF THE TOMATO.

This disease did much damage to tomatoes in the vicinity of Ottawa in 1906, a large percentage of the fruit being rendered useless in some plantations. When the disease begins to spread on the fruit, small roundish spots may be seen usually toward the blossom end. These rapidly increase in size and the tomato becomes discoloured and rotten at the parts affected. The spores are given off from dark mould-like masses on the surface of the fruit, and these being scattered re-infect the fruit. The disease also attacks the leaves. The Tomato Rot can be controlled by spraying with Bordeaux mixture, beginning in the hot-bed and keeping the plants covered until the fruit is nearly ripe.

ONION BLIGHT OR MILDEW.

(*Peronospora Schleideniana.*)

In the Ottawa district onions have suffered during the past few years from the attacks of the Onion Blight, which in some cases has caused serious loss to vegetable growers. As this disease can be prevented by thorough spraying with Bordeaux mixture, all vegetable growers should be aware of the fact. The Onion Blight is a parasitic fungus which spreads by means of spores in summer and is carried over winter by what are known as oospores. These oospores are formed within the leaves and when these are removed in the field or fall off they remain over winter there and re-infect the young plants in the spring or early summer. It will be readily seen that it is important where the disease is troublesome to remove all foliage from the field in the autumn and destroy it. Where possible, the onion should not be grown two years in succession in the same field, and if possible two years should elapse as these oospores retain life for two years. When the disease infects the onion plants by means of the oospores in early summer the mycelium grows through the plants, feeding on the juices, and the first outward indication of the disease is a violet discoloration of the foliage. In a short time the leaves turn yellowish and fall over and give the plant the appearance of being scalded. When the disease is quite apparent, but before the leaves dry up, the latter have a downy look on the surface in places. It is at these points that the spores are being given off from the tiny stalks which have protruded from the mycelium within the leaf. These spores spread rapidly and if conditions are favourable will germinate in half an hour and re-infect other leaves or plants. The spores are so numerous that it does not take long for a large area to become affected. It has been found that the disease spreads most rapidly in damp, warm, close weather, the spores germinating very rapidly under such conditions. In low-lying ground the air is moister than over elevated land and the disease is usually worst there.

Sometimes the disease will be checked before it has done much damage owing to a change in weather conditions, but it may break out again later on. Every leaf which is destroyed weakens the plant and lessens the size of the onions, hence it is very important to check it at the very start or use preventive measures.

Once the spore has germinated and the disease entered the leaf it is not possible to reach the mycelium by spraying, hence it is necessary to spray early enough to kill the spores before they germinate. Spraying should be begun towards the end of June and the plants kept covered with Bordeaux mixture until the end of the season. If the disease appears before spraying has been done, spray as soon as possible. As the leaves of the onion are smooth it is necessary to put the mixture on in as fine a spray as possible so that it will adhere well.

EXPERIMENTS IN DESTROYING APHIS WITH KEROSENE EMULSION MADE WITH FLOUR.

It having been discovered and demonstrated at the Central Experimental Farm that kerosene emulsion could be made with flour instead of soap for holding the kerosene in suspension, this form of emulsion was used successfully in a practical way in 1905 and 1906. As the emulsion made in this way is much easier to make than with soap it was desirable to learn what percentage of oil was necessary to kill the aphis, as soap in addition to its value in holding the kerosene in emulsion is an insecticide itself and without it more kerosene might be required. The following percentages of kerosene were, therefore, used on July 16, 1906, in spraying apple trees badly infested with aphis. Percentages used, approximately: 6 per cent, 7½ per cent, 9 per cent, 11 per cent.

The following notes were made:—

Kerosene Emulsion with—

6 per cent kerosene—Aphis not affected.
7½ per cent kerosene—Aphis not affected.
9 per cent kerosene—Not so effective as 11 per cent but most of the aphis destroyed.
11 per cent kerosene—Practically all aphis destroyed.

In the kerosene emulsion made with soap scarcely 7 per cent kerosene is recommended.

There was no injury to the foliage of the trees in any case. Apple trees in nursery were sprayed on July 12, with very good results, the insects being nearly all killed.

Plum trees were sprayed July 5 and July 13 with 11 per cent kerosene emulsion. Many aphis were killed without apparent injury to the trees.

The Norway Spruce hedges were found to be badly attacked with a species of aphis and on July 26, 27 and Aug. 1, there were about 400 gallons of kerosene emulsion (11 per cent kerosene) used in spraying the hedges with the result that the aphis were destroyed. It was necessary to saturate the trees with the emulsion, holding the nozzle close in so that the spray would envelop the branches as many of the aphis were hidden. The emulsion did not injure the spruce to any extent where the foliage had not been already weakened by the aphis.

Experiments with Different Methods of Preparing the Flour Emulsion.

Experiments had been conducted in the chemical laboratory in conjunction with Mr. Frank T. Shutt, Chemist, who discovered the value of flour in making kerosene emulsion, to determine the weight of flour necessary to hold in suspension certain quantities of kerosene. Experiments had also been tried in different methods of preparing the emulsion and the amount of churning necessary. This work being done with small quantities it remained to determine the best method when made by the barrel.

A dasher was made by nailing two cross-pieces to one end of a pole, the other end being used as a handle. A piece of sacking with a hole in the centre for the pole to go through held in place on the barrel by a hoop prevented the emulsion from splashing out of the barrel.

To make an emulsion having approximately 11 per cent of kerosene (or to be exact, 11⅙ per cent) it was necessary to have 4½ gallons oil to 36 gallons of water.

In making the emulsions the kerosene was put in the barrel first, the flour then poured in and usually mixed well with the kerosene by stirring for a short time with a stick. Twenty gallons of water were then added and then the whole mass churned violently with the dasher in an up and down motion for the required length of time. When the churning was done the rest of the water was added until the barrel was filled.

Following are the emulsions made, one barrel of each:—

July 11.—10 lbs. flour, 4½ gallons kerosene, 36 gallons water, churned for 6 minutes Practically no separation of oil after standing 14 hours.

July 11.—Ditto, churned for 5 minutes. Practically no separation after 14 hours.

July 11.—Ditto, churned 4 minutes. Practically no separation after 14 hours.

July 12.—5 lbs. flour, 4½ gallons kerosene, 36 gallons water, churned for 5 minutes. Only a very slight separation after 3 hours. Emulsion was used after stirring.

July 12.—10 lbs. flour, 4½ gallons kerosene, 36 gallons water. In this case the flour was added to the kerosene without stirring and then 20 gallons water added without stirring, then churned for five minutes and the rest of the water added. After standing for 17 hours there was practically no separation of oil.

July 12.—5 lbs. flour, 4½ gallons kerosene, 36 gallons water. In this case the flour was emptied into the coal oil, then 10 gallons of water added and churned for 4 minutes, after which the barrel was filled with water.

After standing 2 hours there was no separation of kerosene, but after standing over night more than half the oil had separated. The oil and part of the emulsion were then dipped out into another barrel, 5 lbs. of flour were added to it and then churned for 3 minutes, when the emulsion was found quite satisfactory.

From these experiments it was clearly demonstrated that a satisfactory emulsion containing approximately 11 per cent of kerosene could be made by using only 5 pounds of flour to the barrel, in other words only 5 lbs. of flour are necessary, when an emulsion is formed, to hold in suspension 4½ gallons of kerosene for two hours. A poor grade of flour answers the purpose well.

The cost of one barrel of emulsion would thus be:—

	Cents.
5 lbs. flour at $1.75 per 100 lbs.	9
4½ gallons kerosene at 16 cents.	72
Total.	81

When the emulsion is not to be used at once or within two hours, twice the quantity of flour should be used, with which quantity the oil will not separate in twelve hours and more.

Formula.

Formula recommended for kerosene emulsion made with flour for destroying aphis on apple and plum trees.

5 pounds flour (or 10 lbs. if emulsion is not used within 2 hours).

4½ gallons kerosene.

36 gallons water.

Pour the kerosene into the barrel, put in the flour and stir thoroughly. then pour in 20 gallons of water and churn violently for from 4 to 5 minutes, now add remainder of water and the emulsion is ready for use.

There were about 700 gallons of kerosene emulsion made with flour used at the Central Experimental Farm in 1906. The chief advantage of using flour is that the emulsion can be made easily and quickly.

VEGETABLES.

FARMERS' LIST OF BEST VEGETABLES.

The results of variety tests of vegetables for the past eighteen years are summarized in the following table, where a list is given of the varieties of each kind of vegetable which are considered the best to plant.

Asparagus.—Conover's Colossal is the best all round variety, but this is more subject to rust than Palmetto or Argenteuil.

Beans.—Keeney's Rustless Golden Wax or Wardwell's Kidney Wax, for early crop; Early Refugee for medium; and Refugee or 1,000 to 1, for late crop, are the most satisfactory dwarf varieties. Asparagus, Lazy Wife and Old Homestead are three of the best pole varieties.

Beets.—Egyptian Turnip, Meteor and Eclipse are three of the best.

Borecole or Kale.—Dwarf Green Curled Scotch is the best.

Broccoli.—White Cape.

Brussels Sprouts.—Improved Dwarf is the most satisfactory.

Cabbage.—Early Jersey Wakefield (early), Succession (medium), Late Flat Dutch, Houser, Drumhead Savoy (late), Red Dutch (red), is a select list of the best varieties of cabbage. For extra early use, Paris Market is desirable, being a week earlier than Early Jersey Wakefield.

Cauliflowers.—Early Dwarf Erfurt and Early Snowball.

Carrots.—Chantenay is one of the best, but if a good extra early sort is required the Early Scarlet Horn can be planted with advantage. It is a small variety.

Celery.—Golden Self-Blanching (Paris Golden Yellow), Improved White Plume (early), Perfection Heartwell, Triumph, Winter Queen, French's Success, London Red (late) are among the best.

Corn.—Early Fordhook, Early Cory (early), Crosby's Early, Golden Bantam, Henderson's Metropolitan (second early), Perry's Hybrid, Stabler's Early, Early Evergreen, and Black Mexican (medium), Stowell's Evergreen, Country Gentleman (late). In planting, the Country Gentleman should not be omitted, as it lengthens the season very considerably and is of fine quality.

Cucumbers.—Peerless White Spine or White Spine, Cool and Crisp, and Giant Pera are three of the most satisfactory slicing varieties. Boston Pickling is a good pickling sort.

Egg Plant.—New York Improved and Long Purple succeed best.

Lettuce.—Black Seeded Simpson, The Morse, (early curled); New York, Giant Crystal Head, Crisp as Ice, and Improved Hanson (curled cabbage); Improved Salamander, Tennis Ball (cabbage); Trianon and Paris (Cos lettuce).

Melons, Musk.—Long Island Beauty, Hackensack and Montreal Market, of the Nutmeg type; Surprise, Christiana and Emerald Gem, of the yellow fleshed types, are all good.

Melons, Water.—Cole's Early, Salzer's Earliest, Ice Cream, Phinney's Early are good early water melons.

Onions.—Yellow Globe Danvers and Large Red Wethersfield are two of the best onions in cultivation.

Parsnips.—Hollow Crown and Dobbie's Selected are both good sorts.

Parsley.—Doubled Curled is as good as any.

Peppers.—Cayenne, Chili and Cardinal, are three of the best.

Pease.—Gregory's Surprise, Thos. Laxton, Gradus, American Wonder, Premium Gem (early); McLean's Advancer, Nott's New Perfection, Heroine (medium). None of these are tall growing varieties. Stratagem, Juno (dwarf), Telephone (late). Excelsior (Sutton's) is a promising second early sort.

Potatoes.—*Extra early:* Rochester Rose, Early Ohio, Early Andes (pink), Bovee (pink and white), Burpee's Extra Early, Eureka Extra Early, (white); *early:* Early White Prize, Irish Cobbler (white), Vick's Extra Early (pink and white); *Main crop:* Carman No. 1 (white), Money Maker (white), Burnaby Mammoth (pink and white), Late Puritan (white), Dreer's Standard (white).

Radishes.—*Early:* Scarlet White-tipped Turnip, Rosy Gem, French Breakfast, Red Rocket (red); Icicle (white); *late:* White Strasburg, Long White Vienna; ***winter:*** Long Black Spanish, Chinese Rose-coloured.

Rhubarb.—Linnaeus, Victoria.

Salsify.—Long White, Sandwich Island.

Spinach.—Victoria, Thickleaved.

Squash.—Early: White Bush Scalloped, Summer Crook Neck; *late:* Hubbard.

Tomatoes.—Early: Sparks' Earliana, Chalk's Early Jewel, Dominion Day; *Main crop:* Brinton's Best, Trophy, Matchless (scarlet), Burpee's Climax, Autocrat, Livingston's Globe (purplish pink).

There are many varieties of tomatoes which are almost equal in excellence and productiveness.

Turnips.—Early; Extra Early Milan, Red Top Strap Leaf.

Swedes.—Champion Purple Top, Skirving's Improved.

POTATOES.

The year 1906 was one of the most unfavourable seasons for potatoes which has been experienced at the Central Experimental Farm. During the early part of the summer there was sufficient rain to keep the plants growing nicely, but just after the last cultivation was given, dry, hot weather set in and continued all summer, with the result that the plants were stunted, the foliage dried up prematurely and there was a poor crop of tubers. Moreover, during the month of July there was a veritable plague of aphis which attacked the foliage of the potatoes and doubtless did their share in lessening the crop.

The potatoes were planted in good sandy loam soil on May 22. This soil had been well manured for strawberries the previous year but these had been killed by the winter of 1905-6. The soil was well prepared by ploughing and harrowing twice with the disc and once with the smoothing harrow. The drills were made 30 inches apart with the double mould board plough, and about four inches deep. The sets, which had at least three good eyes, were dropped one foot apart in the drills. Sixty-six sets of each kind were planted and then covered with the hoe. The land was harrowed before the potatoes appeared above ground that weeds might be destroyed. Cultivation was then practised and continued as long as possible. Practically level cultivation was adopted as usual, a little soil only being drawn towards the plants. The vines were sprayed with Bordeaux mixture and Paris green four times.

The potatoes were dug on October 1, and while the yield and tubers were small there was practically no rot. This year, however, there was much less advantage than usual in using the Bordeaux mixture owing to the premature drying up of the foliage from drought.

There seems to be an increased interest in potatoes of late which may be partly due to the 'boom' in new varieties in England, and to the fact that blight is causing the farmers more anxiety than it used to do. The result of this increase has been the offering of more varieties for sale. It has been the aim at the Central Experimental Farm to test as many of the new kinds as possible and this year the number of varieties grown in uniform plots was 115, while 42 were grown on smaller plots. The names of the thirty varieties which have yielded best are all that are published this year.

Vegetable Experimental Grounds, Central Experimental Farm, Ottawa, Ont.

TWELVE MOST PRODUCTIVE VARIETIES OF POTATOES: AVERAGE OF FIVE YEARS, 1902-06.

Number.	Name of Variety.	Number of Years under Test.	Season.	Colour.	Quality.	Average Yield per Acre. 1902-1906.	
						Bush.	Lbs.
1	Carman No. 1	12	Medium late	White	Good	387	38
2	Rural Blush	18	Late	Pink and reddish	"	377	5
3	Late Puritan	13	"	White	"	375	19
4	Pearce	7	Medium	Pink and white	"	364	19
5	Money Maker	12	"	White	"	362	7
6	Dreer's Standard	13	Late	"	"	357	17
*7	Burnaby Mammoth	14	Medium	Pink and white	"	350	41
8	Sabean's Elephant	12	Late	White	"	349	22
9	Canadian Beauty	9	Medium	Pink and white	"	348	55
10	I. X. L	14	"	"	"	346	43
11	Dooley	6	"	White	"	344	58
12	Holborn Abundance	18	Late	"	"	333	31

* This variety was first grown under the name of Burnaby Seedling, and then procured under the name of Burnaby Mammoth. The average yield given is from the new strain for three years, and the old one for two years.

The Dr. Maerker and Clay Rose would appear in this list if yield only were taken into consideration, but as these two varieties are inferior in quality they are not included.

POTATOES—TEST OF VARIETIES.

THIRTY MOST PRODUCTIVE VARIETIES IN UNIFORM PLOTS, 1906.

Number.	Name of Variety.	Season.	Quality.	Total Yield per Acre.		Yield per Acre, Marketable.		Yield per Acre, Unmarketable.		Colour.
				Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	
1	Hard to Beat			224	24	158	24	66	..	Yellowish.
2	Wee MacGregor	Medium	Good	215	36	140	48	74	48	White.
3	Dalmeny Beauty	"	"	213	24	162	48	50	36	"
4	Burpee's Extra Early	Early	"	211	12	149	36	61	36	"
5	Early Bird	"		202	24	154	..	48	24	"
6	From L. A. Sovereign, Round Plains, Man			198	..	145	12	52	48	Pale pink.
7	John Bull			182	36	149	36	33	..	Pink with red eyes.
8	American Wonder, O.A.C	Medium	Good	180	24	145	12	35	12	White.
9	Star of the East			176	..	110	..	66	..	Pale pink.
10	Holborn Abundance	Late.	Medium	171	36	132	..	39	36	White.
11	Country Gentleman	Early	Good	165	..	125	24	39	36	Pink and white.
12	Merrill			160	36	90	12	70	24	White.
13	Crine's Lightning	Early	Good	158	24	112	12	46	12	Pink with red eyes.
14	Norcross	Medium	"	158	24	107	48	50	36	White.
15	Sir John Llewellyn			158	24	96	48	61	36	"
16	Early White Prize	Early	Good	156	12	114	24	41	48	"
17	White Mammoth			156	12	110	..	46	12	"
18	Charles Fidler	Medium	Good	154	..	112	12	41	48	"
19	Standard			154	..	101	12	52	48	"
20	Snowdrop			154	..	88	..	66	..	White & pale pink.
21	Snider Best Early	Early		154	..	63	48	90	12	Red.
22	Ashleaf Kidney	Medium	Good	151	48	114	24	37	24	White.
23	Dewey			151	48	103	24	48	24	"
24	Sharpe's Victor			151	48	96	48	55	..	"
25	Early Rose	Early	Good	149	36	114	24	35	12	Pink.
26	Dooley	Medium	"	149	36	103	24	46	12	White.
27	Rochester Rose	Early	"	149	36	99	..	50	36	Pink.
28	White Albino	Medium	"	147	24	101	12	46	12	White.
29	Early Hero			145	12	110	..	35	12	Red.
30	Pearce	Medium	Good	143	..	96	48	46	12	Pink and white.

SMALLER PLOTS OF POTATOES.

The following varieties of potatoes were grown in different sized plots, the number of sets planted varying from eight to thirty-three. A large proportion of thes was sent in gratis for testing by the persons whose names appear after the varieties others were bought in small quantities, as owing to their being novelties the pric was high.

POTATOES; YIELDS FROM SMALLER PLOTS.

Number.	Name of Variety.	Number of Sets Planted.	Total Yield per Acre.		Yield per Acre, Marketable.		Yield per Acre, Unmarketable.		Colour.
			Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	
1	The Factor	33	312	24	149	36	162	48	White.
2	King Edward, from Wm. Wilson, Port Arthur, Ont.	16	290	24	149	36	140	48	″
3	Early Harvester, from Fred Foyston, Minesing, Ont.	16	281	36	193	36	88	..	″
4	Magyar King, from C. Scott, Melville Cross, Ont	33	277	12	140	48	136	24	″
5	Duchess of Cornwall, from the Family Herald, Montreal	33	259	36	162	48	96	48	″
6	Unknown, from B. G. Thoralson, Pine Valley, Man	8	246	24	140	48	105	36	″
7	Early Mortgage Lifter, from Arden, Man	33	242	..	158	24	83	36	″
8	From Geo. Boulet, Normandin, Que	16	237	36	220	..	17	36	
9	Wilson's First Choice	12	237	36	118	48	118	48	″
10	Early Astonisher	12	237	36	118	48	118	48	″
11	Shoat, from Malcolm Macleod, Big Intervale, N. S	33	228	48	132	..	96	48	Pink.
12	Seedling, from Wesley Barkley, Chesterville, Ont.	8	211	12	88	..	123	12	″
13	Longfellow	12	211	12	145	12	66	..	White.
14	Seedling, from Heber Rawlings, Forest, Ont.	33	206	48	66	..	140	48	Pink.
15	Unknown, from J. G. Webster, Hedley, B.C.	33	198	..	88	..	110	..	White.
16	Soleil Levant, from S. Lachance, D'Artagnon, Que	33	176	..	48	24	127	36	Pink.
17	Blue Prolific, from J. P. Helm, Tignish, N.S	33	176	..	132	..	44	..	Blue.
18	Maple Leaf, from J. C. Walker, Holland, Man	33	176	..	74	48	101	12	White,
19	Hick's Jubilee, from John Hick, Belleville, Ont.	33	176	..	70	24	105	36	″
20	Rust Proof	16	176	..	123	12	52	48	Pale pink.
21	Midlothian Early	16	158	24	114	24	44	..	White.
22	Sutton's Reliance, from A. Smith, Ladners, B.C	16	158	24	44	..	114	24	Pale pink.
23	Grafted Potato, from Chas. Filteau, St. Nicolas, Que	33	154	..	114	24	39	36	Pink, with re eyes.
24	Wortley, from G. F. Bonewell, North Augusta, Ont.	33	149	36	66	..	83	36	Pink.
25	June	16	114	..	61	36	52	48	Pale pink.
26	Dalmeny Early	16	96	48	44	..	52	48	White.
27	Eldorado (Dobbie)	33	92	24	..	..	92	24	″
28	King Edward VII (Dobbie)	33	83	36	..	..	83	36	White, splashe with red.
29	Solanum Commersonii Violet	16	79	12	44	..	35	12	Purplish blue.
30	Sausisse, from G. M. Bonmarvel, Sintaluta, Sask	33	17	36	..	..	17	36	

Other varieties which came in too late to be compared with the above were: Seedling, from Jas. W Stairs, Halifax, N.S.; Uruguay, from E. Chegrion, Manitoba; Eldorado, from Smith Bros., Beachville Ont.; Immigrant, from W. J. Dickson, Springfield, N.S.; Sutton's Prolific, from R. Gammon, Lachin Locks, P.Q. The crop from these were saved and these varieties will be compared with others in 1907.

SPRAYING POTATOES TO PREVENT BLIGHT AND ROT.

In 1906 the potatoes were sprayed as usual with Bordeaux mixture and other fungicides to prevent and control the blight and rot. Owing to the extremely hot and dry weather which caused the foliage to scald and dry up, and to the presence of aphis in large numbers the foliage was so injured that Bordeaux mixture could have little effect, and as the results would be very misleading it has been thought best not to publish them. It may be worth repeating here, however, that for an average of four years previous to 1906 potatoes sprayed with Bordeaux mixture gave an average yield of 310 bushels 20 lbs. per acre, while those not sprayed with Bordeaux mixture only yielded at the rate of 217 bushels 49 lbs. per acre, a difference of 92 bushels 31 lbs. per acre. At 45c. per bushel this means an average increase in value for four years of $41.62. Enough in one year to buy a good spray pump and pay for the seed that would be used for the next crop.

POTATOES—TEST OF RESISTANCE TO BLIGHT AND ROT.

It has been known for a long time that Bordeaux mixture will control the blight and rot disease of the potato if spraying is thoroughly done, and the foliage kept covered with the mixture from about the middle of July to the end of the season. Unfortunately, it is difficult to get farmers to spray and as a result the loss from blight and rot is very great in some parts of Canada.

It is important, therefore, to know which varieties will withstand the blight best so that if farmers will not spray they will at least plant the varieties that will give them the best yields without spraying. For a number of years notes have been taken at the Central Experimental Farm of the varieties of potatoes which remained green longest, thus indicating their relative resistance to blight. A list of ten of the varieties found most resistant was published by the writer in Bulletin No. 49 on Potato Culture. As none of the varieties there mentioned are absolutely blight proof it seemed important to find out if their resistance to blight can be increased by selection and with this object in view thirty-two varieties were planted in 1905.

The tubers from the most productive hills of fourteen of the most blight resistant varieties for that year were kept separate, each hill being dug individually at first and then the tubers from these best hills were mixed and stored together. Of seven of these varieties enough seed was saved from the hills that were left to plant this year for comparison with the potatoes from selected hills. The results, which are striking, are given in the table below.

These potatoes were not sprayed with Bordeaux mixture or any other fungicide, but were sprayed with Paris green to preserve the foliage from the potato beetles.

In addition to the seven varieties tested for comparison with those from unselected seed twenty-four other sorts were tested, seven of which were from selected hills in 1905. The best hills of most of the varieties in this test were again kept separate this year.

It is interesting to note that the varieties which stayed green longest were not in all cases the best croppers.

The potatoes for this test were planted on May 23, and dug on October 10. They received thorough cultivation, but owing to the extremely dry summer the yields are much less than they otherwise would be.

Potatoes—Test of Resistance to Blight.

Name of Variety.	Total Yield per Acre.		Yield per Acre Marketable.		Yield per Acre Unmarketab	
	Bush.	lbs.	Bush.	lbs.	Bush.	lb
Clay Rose (selected, 1905)	242	..	158	24	83	36
" (unselected, 1905)	189	12	92	24	96	48
Rural Blush (selected, 1905)	237	36	140	48	96	48
" (unselected, 1905)	176	..	96	48	79	12
Vermont Gold Coin (selected, 1905)	211	12	123	12	88	..
" " (unselected, 1905)	184	48	105	36	79	12
Morgan Seedling (selected, 1905)	211	12	123	12	88	..
" (unselected, 1905)	176	..	123	12	52	48
Carman No. 1 (selected, 1905)	193	36	105	36	88	..
" (unselected, 1905)	206	48	149	36	57	12
State of Maine (selected, 1905)	189	12	145	12	44	..
" (unselected, 1905)	149	36	88	..	61	36
Carman No. 3 (selected, 1905)	149	36	96	48	52	48
" (unselected, 1905)	149	36	105	36	44	..
Average yield selected (7 varieties)	204	55	127	36	77	19
" unselected (7 varieties)	176	..	108	45	67	15
Wee MacGregor	264	..	176	..	88	.
Manistee	259	36	193	36	66	..
Nott's Peachblow (selected, 1905)	255	12	140	48	114	24
Empress Queen	250	48	189	12	61	36
Holborn Abundance (selected, 1905)	250	48	162	48	88	..
Dalmeny Beauty	237	36	176	..	61	36
American Giant (selected, 1905)	202	24	158	24	44	..
Dr. Maerker (selected, 1905)	202	24	140	48	61	36
Swiss Snowflake	198	..	136	24	61	36
Rose No. 9 (selected, 1905)	193	36	123	12	70	24
Charles Fidler	167	12	140	48	26	24
Jubilee (selected, 1905)	158	24	114	24	44	..
Norcross	158	24	114	24	44	..
Dreer's Standard	158	24	105	36	52	48
June	140	48	88	..	52	48
Northern Star	127	36	88	..	39	36
Late Puritan	127	36	88	..	39	36
Uncle Sam	123	12	96	48	26	24
Woltman	123	12	52	48	70	24
Rust Proof	114	24	88	..	26	24
Hibernia	66	..	26	24	39	36
Peachblow	52	48	26	24	26	24
Sutton's Discovery (selected, 1905)	26	24	17	36	8	48
Money Maker	44	..	..	..	44	.

SCOTCH VERSUS ENGLISH SEED POTATOES.

When in England in 1905, the writer visited the trial grounds of Messrs. Sutto & Sons, Reading, England, and was struck with the difference in growth of potatoe grown from Scotch seed and from English seed of the same variety. Potatoes fror English seed were beginning to ripen while those from Scotch seed were still quit green, and it was evident that the yields from Scotch seed would be much greate than those from English, which proved to be the case.

Messrs. Sutton & Sons were good enough to furnish the Central Experimenta Farm with 3 lbs. each of ten varieties of potatoes of Scotch and English seed. Thirty three sets were made from each lot and planted on May 22. These potatoes wer then treated like the uniform test plots. The results are given below. Owing to th extremely dry season the potatoes were very small, only a small proportion bein marketable.

POTATOES—SCOTCH VERSUS ENGLISH SEED.

Number.	Name of Varieties.	Total Yield per Acre.				Yield per Acre Marketable.				Yield per Acre Unmarketable.			
		Scotch.		English.		Scotch.		English.		Scotch		English.	
		Bush.	lbs.	Bush.	lbs.	Bush.	lbs.	Bush.	lbs.	Bush.	lbs.	Bush.	lbs.
1	Sutton's Windsor Castle	167	12	83	36	35	12	17	36	132	..	66	..
2	Sutton's Ideal..........	136	24	101	12	44	..	48	24	92	24	52	48
3	The Sutton Flourball...	127	36	48	24	22	..	22	..	105	36	26	24
4	Sutton's Supreme......	101	12	61	36	39	36	17	36	61	36	44	..
5	Sutton's Reliance	92	24	61	36	13	12	.....	......	79	12	61	36
6	Sutton's Harbinger.....	88	..	52	48	30	48	22	..	57	12	30	48
7	Sutton's Epicure.......	61	36	92	24	13	12	22	..	48	24	70	24
8	Sutton's Discovery.....	35	12	44	..	.....	......	....	......	35	12	44	..
9	Sutton's May Queen....	22	..	96	48	.....	......	39	36	22	..	57	12
10	Sutton's Ninetyfold....	13	12	101	12	.....	......	44	..	13	12	57	12
	Average.........	84	29	74	22	19	48	23	19	64	41	51	3

It will be seen that the varieties from Scotch seed averaged at the rate of 10 bushels per acre higher than those from English seed. This is not a large amount in itself, but considering that the average yield of the ten varieties was only at the rate of 84 bushels 29 lbs per acre, the increase is considerable. If the year had been an average one the difference would probably have been nearer forty bushels as the yield might easily be four times as great as in 1906.

The reason why potatoes from Scotch seed give better results than those from English seed is that in Scotland, and in Ireland also, the climate is more equable than it is in England during the growing season and the tubers are developed more slowly and are not so liable to be checked by dry hot weather. It has been shown that immature seed will give greater crops than mature seed, one reason probably being that immature seed keeps in better condition until planting time than that which is mature, which will sprout earlier. Thus the Scotch and Irish seed potatoes which are not so mature as the English produce better crops. At the Central Experimental Farm it was found that immature seed gave better results than mature seed of the same variety, both grown at the experimental farm, but one not planted the previous year until July and hence not maturing. Whether potatoes would eventually increase or decrease in yield by planting immature seed every year has not yet been proved.

TOMATOES.

TEST OF VARIETIES.

The number of varieties of tomatoes tested at the Central Experimental Farm has been gradually reduced each year and in 1906 there were 38 kinds under test compared with 93 five years ago. Those tested last year included the best of the older varieties and the novelties. The number tested seems large when one considers that in half a dozen varieties or less would be included all the very best, but it is often not possible for a farmer to get the very best and by his knowing a few others which are almost as good he can get them instead.

The best strains of the Sparks' Earliana and Bruce's Dominion Day for early, and the Chalk's Early Jewel for early and main crop are three of the best scarlet tomatoes to plant. Where an early pink or purplish pink variety is desired the June Pink, a novelty of 1906, gives promise of being one of the best.

Where larger tomatoes are desired for main crop the Matchless, Trophy, and Brinton's Best of the scarlet varieties, and Burpee's Climax, Autocrat, Acme, and Democrat of the purplish pink are among the best. The Livingston's Globe, a new variety is very promising. Of later kinds, Marvel and Stone are handsome scarlet sorts. The kind of tomatoes produced will depend very much on the selection made in previous years, hence poor strains of the above varieties might not be so good as good strains of some other sorts.

The greatest interest in tomatoes is centred in the early varieties and seedsmen vie with one another in claiming that theirs is the earliest tomato in existence. A large proportion of the varieties tested at the Central Experimental Farm are these early sorts as it is important for the growers to know which are the earliest and best, as they are the ones which are most profitable. When the Sparks' Earliana was introduced in 1900 it was tested at the experimental farm and reported as a promising new variety that year. It is now the leading early sort. The Chalk's Early Jewel is almost as early as the Sparks' Earliana, is of much better shape, and owing to its more vigorous habit of growth it stands the heat better and is much more productive than the Earliana. The Bruce's Dominion Day is a Canadian variety which compares very favourably with the Earliana in earliness. The variety as it is now sold is smoother than it used to be.

A new variety introduced in 1906 called the June Pink, is promising. While in the following table it is shown to only yield as much as Chalk's Early Jewel up to August 8, it had yielded a little more than that variety up to August 2.

Steele's Earliest of All, which had ripened less fruit up to August 8 than some other varieties not included in the table of earliest varieties for 1906, ripened more fruit up to July 25 than these varieties, which entitled it to a place among the earliest.

Marked results have been obtained during the past three seasons from seed saved from the earliest tomatoes ripened at the Central Experimental Farm. These strains have proved earlier every season than plants from seed obtained elsewhere. In 1906, for instance, five plants of the Chalk's Early Jewel (C.E.F. seed) ripened 11 lbs. of fruit up to August 8, and 5 lbs. up to August 2. The same number of plants from seed from the introducers only gave 4 lbs. 8 ozs. of ripe fruit up to August 8, and 1 lb. 8 ozs. up to August 2. This means that when the price was still high on August 2, our own strain produced at the rate of 2,722 lbs. 8 ozs. ripe fruit per acre and the introducers strain only 816 lbs. 12 ozs. per acre. In the case of the Sparks' Earliana, the C.E.F. strain gave 9 lbs. 8 ozs. ripe fruit up to August 10, and the introducer's strain gave 9 lbs. 13 ozs., a little more, but up to July 25, when the price of tomatoes was much higher, the C.E.F. strain had ripened 2 lbs. of fruit and the introducers best strain only 1 lb. 13 ozs., and the introducers ordinary strain 1 lb. Even 3 ozs. difference in the yield from five plants means a difference per acre of over 105 lbs., while a difference of 1 lb. means over 544 lbs. per acre.

Among the newer main crop varieties the Livingston's Globe is the most promising. This variety as tested here in 1906 was medium to above medium in size, thick, regular, smooth, firm, purplish pink, and one of the most attractive of that colour.

The season of 1906, while favourable to the early ripening of tomatoes was so dry that the crop was comparatively small. Throughout this district many tomatoes were affected with the rot disease. Very few tomatoes were injured by this disease at the experimental farm as the plants were well sprayed with Bordeaux mixture.

The seed was sown in the hotbed on April 2, the plants pricked out into strawberry boxes on April 26 and kept in a cold frame until June 4, when five plants of each were planted in the field, four feet apart each way. The soil was a light sandy loam. The soil was well cultivated until the plants covered the ground. The plants were not pruned or trained in any way in this test.

TOMATOES—TWELVE BEST YIELDING VARIETIES, 1906.

Name of Variety.	Date of First Ripe Fruit.		Yield of Ripe Fruit to Aug. 8, 1906, five plants.		Yield of Ripe Fruit per acre to Aug. 8, 1906.		Total Yield of Ripe Fruit per plant, 1906.		Total Yield of Ripe Fruit—All Pickings, 5 plants, 1906.		Remarks.
			Lbs.	Ozs.	Lbs.	Ozs.	Lbs.	Ozs.	Lbs.	Ozs.	
1 Freedom	July	24	7	8	4,083	12	13	3	66	..	Medium to below medium in size, firm, regular, smooth or slightly ribbed, scarlet.
2 Acme	"	30	3	8	1,905	12	13	1	65	4	Medium size, regular, smooth, purplish red. One of the most attractive of this colour.
3 Dreer's Earliest Cluster.	"	23	8	4	4,492	2	12	12	63	12	Medium to above medium in size, flattened, slightly wrinkled, irregular, scarlet. Not attractive.
4 Democrat	"	29	9	4	5,036	10	12	10	63	..	Above medium size, smooth, regular, purplish pink. One of the best.
5 Frogmore Selected	Aug.	4	2	8	1,361	4	12	4	61	4	Medium to below medium in size, roundish, smooth, regular, scarlet, attractive.
6 Bright and Early	July	20	5	12	3,130	14	12	2	60	12	Below medium to small, roundish, regular, smooth, scarlet. Attractive. Too small.
7 King Humbert	"	30	3	4	1,769	10	11	7	57	4	Small, oval or heart shaped, smooth, regular, scarlet.
8 Tenderloin	Aug.	4	2	..	1,089	..	11	2	55	12	Above medium to large, flattened, fairly smooth, some wrinkled. Not specially promising.
9 Matchless	"	5	2	4	1,225	2	10	14	54	8	Medium to above medium in size, regular, smooth, scarlet. One of the most attractive.
10 Chalk's Early Jewel (Robertson.)	July	28	6	4	3,403	2	10	13	54	..	Medium size, roundish, smooth, regular, scarlet, attractive.
10a Chalk's Early Jewel (C.E.F.)	"	24	11	..	5,989	8	10	13	54	..	" "
10b Chalk's Early Jewel (Burpee.)	"	24	4	8	2,450	4	9	14	49	8	" "
11 Trucker's Favorite	Aug.	1	2	8	1,361	4	9	11	48	8	Above medium to large, purplish pink, smooth, fairly regular firm, rather late.
12 Turner's Hybrid	July	30	7	4	3,947	10	9	9	47	12	Above medium size, flattened. purplish pink, fairly smooth and regular.

TOMATOES—SIX EARLIEST VARIETIES, 1906.

1 June Pink	July	24	11	0	5,989	8	6	14	29	4	Medium to above medium in size, rather irregular in shape, most smooth, but some wrinkled, purplish pink.
2 Chalk's Early Jewel (C.E.F.)	"	24	11	0	5,989	8	10	13	54	0	Medium size, roundish, smooth, regular, scarlet, attractive.
3 Dominion Day	"	20	9	12	5,308	14	6	14	34	8	Medium size, smooth, but rather uneven in shape, scarlet.
4 Spark's Earliana (J. & S. Improved Strain).	"	20	9	13	5,342	14	6	10	33	1	Medium to below medium in size, smooth, fairly regular, scarlet.
4a Spark's Earliana (C.E.F.)	"	19	9	8	5,172	12	5	0	25	0	Medium to below medium in size, smooth, fairly regular, scarlet.
4b Spark's Earliana (G. A. Robertson)	"	20	8	5	4,526	2	5	4	26	5	Medium to below medium in size, smooth, fairly regular, scarlet.
5 Maule's Earliest	"	20	7	12	4,219	14	6	8	32	8	Medium size, flattened, wrinkled, scarlet.
6 Steele's Earliest of All.	"	22	5	4	2,858	10	5	14	29	4	Medium size, flattened, wrinkled, scarlet.

TOMATOES—EXPERIMENTS IN PRUNING.

The experiment with a certain method of pruning tomatoes begun in 1904 was continued again in 1906. The plan adopted is the following: As soon as the plants in the hot-bed have six strong leaves the tops are nipped off and the plants given more room, being placed 5½ inches apart. The object of pinching off the tops is to cause new shoots to develop at the axils of the leaves in order to have six branches bearing tomatoes instead of having only the one cluster usually found at the top of the plants, thus getting a larger crop early in the season. In one part of the experiment no other pruning is done than merely the nipping off the top as described. For comparison, all laterals except the six first ones which develop from the axils of the six leaves are removed as they appear, necessitating going over the plants twice. In 1906 the seed was sown on March 13, the young plants pricked out on April 5 and transplanted again into strawberry boxes on April 27. The plants were set out in the open field on June 5, the tops having been nipped back previously as described. When set out, the plants had six laterals all showing flower clusters. On July 7 and 21 what other laterals had developed were pinched out of 20 of the plants. Twenty plants had merely their tops pinched off at six leaves in the hot bed and no further pruning in the field, and twenty plants were left unpruned. Two varieties were used, viz.: Sparks' Earliana and Chalk's Early Jewel, the latter having been used for only two years. In the following table most of the figures given are average results for three or two years.

Name of Variety.	Date of First Ripe Fruit 1906.	Average Date of First Ripe Fruit 1904-6.	Ripe Fruit First Three Pickings, Average 1904-6.		Estimated Yield per Acre, Ripe Fruit First Three Pickings, Average 1904-6.		Yield of Ripe Fruit Fourth Picking Aug. 8th, 1906.		Total Yield of Ripe Fruit 1906.		Total Yield of Ripe Fruit Average 1904-6.		Estimated Total Yield per Acre Ripe Fruit 1904-6.	
			Lbs.	oz.	Lbs.	oz.	Lbs.	oz.	Lbs.	oz.	Lbs.	oz.	Tons.	lbs,
Sparks' Earliana:														
Unpruned	July 19	July 22	11	7	1556	15	18	..	230	13	165	11	11	554
Top pinched off at six leaves	July 28	Aug. 1	13	3	1795	2	90	8	388	4	245	15	16	1478
Top pinched off at six leaves and all laterals except first six removed in field	July 28	Aug. 1	24	13	3377	10	77	..	282	..	183	2	12	928
Chalk's Early Jewel:		1905-6.	1905-6.		1905-6.						1905-6.		1905-6.	
Unpruned	July 19	July 18	9	2	1242	2	13	8	226	8	233	9	15	1794
Top pinched off at six leaves	Aug. 1	July 31	..	12	102	1	41	8	318	12	287	6	19	1119
Top pinched off at six leaves and all laterals except first six removed in field	Aug. 3	Aug. 1	1	6	187	3	42	..	255	4	214	8	14	1199

It will be noticed in the above table that the early fruit from the pruned plants in comparison with the unpruned is greater in the case of the Sparks' Earliana than the Chalk's Early Jewel. In fact the unpruned plants average considerably more than from the pruned. Note, however, the marked increase in yield from the pruned plants at the fourth picking which was August 8, 1906, still an early date with the prices good. In the case of the Spark's Earliana there were only 18 lbs. from the unpruned and 90 lbs. 8 ozs. and 77 lbs. from the pruned. The proportion in the case of the Chalk's Early Jewel is almost as great. In conclusion, it may be stated that by this method of pruning the first ripe fruit is several days later than the few scattered specimens from the unpruned. The crop of fruit which is produced in the early part of the season is much greater than that from the unpruned. An important point to remember is to have the plants well advanced when they are put out, for it can easily be seen that if the plants are started early enough there is no reason why the six stems bearing the flower clusters should not produce six times as much fruit at the first picking as from the single cluster on ordinary plants. At Ottawa the plants have not yet been quite far enough advanced when planted out to be equal in earliness with those not pruned. It will be necessary to start them still earlier.

THE FOREST BELTS.

The trees in the Forest Belts at the Central Experimental Farm continue to make satisfactory growth on the whole, and every additional year's growth of the trees adds to the value of the experiment begun in 1887 of planting these forest trees. The objects for which the belts were planted have been dealt with in recent reports and need not be repeated here.

During the summer of 1906 the lower branches which were dead were sawn off the evergreens in the belts in order to clear the trunks and to make the danger of destruction from fire less. Measurements were taken of average trees in the belts as usual. In the annual report for 1904 a table showing the height and diameter of some of the species up to that time was given. Following will be found a table showing the height and diameter in the autumn of 1906:—

GROWTH of Trees in the Forest Belts at the Central Experimental Farm.

Name of Species.	Character of Soil.	When Planted.	Distance apart.	Age or Height when Planted.	Average Height, 1902.		Average Height, 1903.		Average Height, 1904.		Average Height, 1905.		Average Height, 1906.		Average Diameter 4 ft. 6 in. from ground, 1906.
			Feet.	Years.	ft.	in.	ft.	in.	ft.	in.	ft.	in.	ft.	in.	in.
Black Walnut—Juglans nigra..........	Low sandy loam...........	1888	5× 5	1	12	9	13	..	13	6	13	8	14	..	2¼
" "	"	1888	10×10	1	8	5	8	11	9	3	9	10	10	4	2
" "	Sandy loam with small stones	1889	5× .5	2	18	8	19	6	20	1	20	6	20	11	3½
" "	" " ..	1889	10×10	2	14	2	14	7	15	2	15	4	15	7	3¼
" "	Clay loam..............	1888	10× 5	1	16	2	16	10	17	8	19	7	20	10	3⅜
Butternut—Juglans cinerea............	Low sandy loam	1889	5× 5	1	12	..	12	..	12	2	12	4	12	4	2
" "	"	1888	10×10	1	10	6	10	8	10	10	11	1	11	2	2
Silver-leaved Maple—Acer dasycarpum ..	Light sandy loam.........	1889	5× 5	3	28	5	28	7	28	10	29	4	29	9	**3**
" " ..	"	1889	10×10	3	25	8	25	5	25	8	25	11	26	**2**	4½
European White Birch—Betula alba.....	"	1889	5× 5	3	Dead.		..	..	..	..	..	..	..	..	..
" "	"	1889	10×10	3	39	5	Dead.		..	..	..	..	..	..	..
Canoe Birch—Betula papyrifera.........	"	1889	5× 5	3	33	1	33	5	34	3	35	..	35	4	4⅛
" "	"	1889	10×10	3	34	1	34	9	35	1	36	9	37	8	5⅞
Yellow Birch—Betula lutea	"	1889	5× 5	3	23	9	24	1	24	2	24	6	25	7	3
" "	"	1889	10×10	3	24	3	24	9	25	6	27	..	28	2	4½
White Elm—Ulmus americana	Sandy loam...............	1889	5× 5	3	18	11	19	9	20	2	20	8	21	6	2⅜
" "	"	1889	10×10	3	20	9	21	4	22	4	24	2	25	..	4½
Black Ash—Fraxinus sambucifolia.......	Black muck................	1889	5× 5	2	19	4	19	9	20	5	21	9	23	8	2⅝
" "	Low sandy loam...........	1889	10×10	2	N'rly dead		..	..	..	..	..	..	..	..	..
Green Ash—Fraxinus viridis...........	Black muck...............	1889	5× 5	3	24	..	25	1	26	10	27	9	28	11	3½
" "	Low sandy loam...........	1889	10×10	3	19	8	21	..	21	6	21	8	22	5	4
Red Ash—Fraxinus pubescens..........	Black muck...............	1889	5× 5	2	26	..	26	11	28	8	30	1	31	10	3⅜
" "	Light sandy loam.........	1889	10×10	2	20	3	21	4	22	11	23	10	24	10	3⅜
White Ash—Fraxinus americana	Black muck...............	1889	5× 5	3	25	7	26	1	26	7	28	2	29	3	2¾
" "	Light sandy loam.........	1889	10×10	3	26	9	27	7	28	..	29	7	30	7	4
Black Cherry—Prunus serotina	Light sandy loam and gravel.	1889	5× 5	3	21	2	22	1	23	2	24	..	24	9	3
" "	" " ..	1889	10×10	3	29	..	30	3	32	1	33	4	35	2	5
Box Elder—Acer Negundo.....	Light sandy loam.........	1889	5× 5	2	25	8	26	1	26	6	26	6	26	8	3¼
				in.											
Scotch Pine—Pinus sylvestris..........	Sandy loam with gravel.....	1888	5× 5	18	26	9	28	..	28	3	28	10	29	11	4¼
" "	" "	1888	10×10	18	22	9	24	2	24	4	24	11	25	9	5½
" "	Low sandy loam with gravel.	1888	.5× 5	18	25	8	26	10	27	9	28	4	29	5	3½
" "	Low sandy loam...........	1888	10×10	18	24	3	25	5	26	6	27	4	28	3	5⅝
" "	Light sandy loam...... ...	1888	10× 5	18	27	2	28	7	29	4	30	11	32	2	8⅜
" "	Clay loam........	1888	10× 5	18	22	10	23	7	24	8	25	8	26	7	6⅜
" "	Light sandy loam and gravel.	1888	10× 5	18	25	7	26	11	27	9	30	11	32	2	8⅝
" "	" " ..	1887	3× 3	9	27	..	28	4	29	4	28	7	29	5	7

Austrian Pine—Pinus austriaca	Light sandy loam	1889	5 × 5	18	21	9	23	4	24	10	26	1	27	6	5
" "	"	1889	10 × 10	18	20	10	22	4	23	6	24	8	26	1	6¾
" "	"	1888	10 × 5	15	21	1	22	2	23	3	24	3	25	10	6⅙
" "	Clay loam	1888	10 × 5	15	20	10	22	4	23	7	23	11	25	3	6
" "	Light sandy loam and gravel	1888	10 × 5	15	23	1	24	5	25	7	26	9	28	2	6½
" "	" "	1887	3 × 3	15	20	11	22	5	23	7	25	1	26	5	3¾
White Spruce—Picea alba	Light sandy loam	1889	5 × 5	15	15	1	15	7	16	5	16	9	17	4	2⅚
" "	"	1889	10 × 10	15	15	6	16	6	17	8	18	5	19	4	4
Norway Spruce—Picea excelsa	"	1889	5 × 5	18	18	7	19	1	20	1	21	5	23	1	3¼
" "	"	1889	10 × 10	18	23	3	24	9	25	5	26	4	27	11	5
" "	"	1888	10 × 5	15	27	4	29	3	30	4	31	8	33	..	5⅔
" "	Clay loam	1888	10 × 5	15	27	7	29	11	30	11	33	3	35	8	6¾
American Arbor-vitæ—Thuya occidentalis	Low sandy loam and black muck	1889	5 × 5	18	17	2	18	2	18	11	20	..	20	7	3½
" "	Low sandy loam	1889	10 × 10	18	15	6	16	1	17	3	18	3	19	1	3⅓
European Larch—Larix europæa	"	1888	5 × 5	feet. 2	28	11	30	4	31	10	33	5	33	11	4⅙
" "	"	1888	10 × 10	2	28	9	29	7	31	2	32	4	33	..	5½
White Pine—Pinus Strobus	Light sandy loam with gravel	1889	5 × 5	8 to 10 in.	26	1	26	10	28	11	30	1	31	8	4½
" "	" "	1889	10 × 10	8 to 10 in.	24	5	26	..	27	9	29	1	30	9	6⅚

NOTE:—The low sandy soil in which the Black Walnut and Butternut are growing appears quite unsuitable and the trees are almost at a standstill. The light sandy soil in which some of the White Spruce are is not very suitable nor is the sandy loam where the White Elm are growing. These trees have all made much better growth in other soils.

At Ottawa the experience has been with trees 10 x 10 feet apart, 10 x 5 feet apart 5 x 5 feet apart, 3 x 3 feet apart, and 2½ feet apart. In some cases the trees are in clumps of single species, and in others they are mixed. Ten by ten feet has been found much too far apart to plant trees where cultivation is given as it would be under almost any circumstances. In some parts of the belt it was necessary to cultivate the ground between the trees for ten years before the trees interlaced sufficiently to shade the ground well. At 10 x 5 feet cultivation was necessary in some soils between thin foliaged trees such as ash and walnut for eight years after planting In mixed plantations with trees 5 x 5 feet apart cultivation was necessary for from four to five years. It is evident that this distance is too great for a farmer to plant trees with the idea of cultivating them, as few farmers would cultivate a plantation that long. This distance is also too great from the standpoint of timber production.

In 1889 nearly 5,000 trees and shrubs were planted out in rows 2½ feet apart each way, mixed so that a large proportion of them were shrubs planted merely for the purpose of saving cultivation. The shrubs used for this purpose were Ninebark or Spiraea (*Neillia opulifolia*), Alder Buckthorn (*Rhamnus Frangula*), Rosemary Willow (*Salix rosmarinifolia*), and the Sand Cherry (*Prunus pumila*). The trees planted in this way have done well. The ground was cultivated for only two seasons. It has been found, however, that this distance is a little too close, as it was necessary to lop off some of the branches of the shrubs to prevent the trees being smothered, the shade being very dense. It is apparent from our experiments that trees planted about 3 feet apart each way, 3 x 4 feet apart, or 4 x 4 feet apart, depending on the kinds of trees and how they are mixed, would be the most satisfactory distance for the farmer from the standpoint of economy in cultivation and getting the ground shaded.

In order to gain information from our own experience regarding the relative ability of the slower growing trees to live and thrive under the shade of faster growing species, the following notes were made in the mixed forest belt in the autumn of 1904 and confirmed recently. The following notes were taken in a belt of mixed trees planted in the autumn of 1894, so that just ten years had elapsed since the time of planting. The trees consisted mainly of Austrian pine, Scotch pine, white pine, Douglas fir, Norway spruce, Rocky Mountain blue spruce, American arbor-vitæ, tamarac, box elder, American elm, green ash, red ash, white ash, rock elm, and canoe birch. The soil where these trees were growing was mostly black muck.

Austrian Pine.—Does not stand shade well. In some instances has been killed outright.

Scotch Pine.—Suffers badly in shade. In some instances has been killed outright. Where not killed, leader is destroyed and tree is very weak.

White Pine.—Stands shade a little better than Scotch pine, retaining its leader when the Scotch does not.

Douglas Fir.—Is much weakened by shade, but retains leader.

Norway Spruce.—Stands shade better than any of the pines.

Rocky Mountain Blue Spruce.—Stands shade about as well as Norway spruce, but does not stand as much chance of development as the Norway as it grows so slowly.

American Arbor-Vitæ.—Stands shade well, but makes little growth in it.

Tamarac.—Tamarac which was transplanted from swamp in 1894 has pushed up rapidly and is holding its own, but as foliage is comparatively thin it does not injure other trees. This tree has done better in the moist, gravelly soil than in the black muck, and in the gravelly soil is as tall as the American elm.

American Elm.—Has reached the greatest height and is towering above most other trees. It has made a good straight trunk. This and the box elder should do well together. The dense shade of the box elder should force an upward growth of the elm, and the elm be able to hold its own on account of its rapid growth.

Red and White Ash and Box Elder.—Are almost as tall as the American elm and are all holding their own. The dense shade of the box elder is what has done most to injure the pines.

Black Ash.—Is little more than half the height of the white.

In addition to the foregoing, the following notes were taken in a mixed belt of trees planted in the spring of 1888, the trees having had seventeen years' growth. The soil in this belt was gravelly and well drained. The trees were planted 5 x 10 feet apart:—

European White Birch.—Are the tallest trees.

Green ash, box elder, and Scotch pine are about equal in height. American pine is from four to five feet shorter.

Norway spruce, where it has had a chance is considerably taller than Scotch pine, and European larch is about the same height as Norway spruce.

There were no American elms for comparison in this part of the belt.

In another part of the belt where the trees were planted 5 x 5 feet apart in the spring of 1893, the soil being sandy loam, well drained, with more or less limestone rock in it, the following notes were taken:—

Austrian Pine.—Have nearly all been killed by the shade.

Scotch Pine.—Where much shaded are very weak or dead.

White Pine.—Has stood shade better in this belt than Scotch pine, but have not grown as fast where not influenced by shade.

Norway Spruce.—In this soil on account of its rapid growth has outstripped most heavy foliaged trees and is among the leading ones.

The American Elm.—Is not among the leading trees here and is barely holding its own, and in some cases has been nearly or quite killed. The soil is evidently not moist enough.

Red Ash.—In this soil has not made rapid growth and many trees are dead.

White Ash.—Is one of the leading trees.

European White Birch.—Is the tallest tree, but they are now beginning to die. By 1906 most of the white birch were dead.

White Oaks.—Have been killed by shade, but they appear to stand it very well as trees are alive which are much shaded, although they are making little growth.

The black walnut trees have shot up tall and straight and are among the leading trees, but many were overshadowed before they got ahead and have been killed or are barely alive.

Red Oak.—Has shot up well and is one of the leading trees.

Rock Elm.—Has done well.

Norway Maple.—Has shot up well and is one of the leading trees.

Hard Maple.—Though slender is shooting up.

Red Maple.—Side by side with Norway Maple is affected about the same by shade and is about equal in height. Norway is, if anything, slightly leading and is the more vigorous tree.

White Spruce.—Though standing shade well, got behind in the race and is not a leading tree.

American Mountain Ash.—Stands shade well.

After nineteen years' experience with many species of trees planted at different distances apart, both in plantations of single species and where mixed, some conclusions have been drawn as to the best trees for the farmer to plant where the conditions are somewhat like those at Ottawa.

In our judgment, the average farmer of to-day should plant the trees which will be most likely to look after themselves the soonest, but which will not destroy one another until those which have to be removed first are large enough to supply a fair amount of fuel. At the same time and keeping this in view, he should choose as far as possible those trees which will give him the best fuel and the best wood for other purposes.

The simplest method of planting would be to use white pine, Scotch pine, and Norway spruce, either in blocks by themselves or mixed together. These three trees all grow rapidly, shade the ground quickly, will not destroy one another for a long time and are all useful for timber. Although making considerable fuel in a short time, they are relatively poor for this purpose, hence some other kinds should be grown with them.

In our experience the canoe birch, European white birch, American elm, and European larch make a large amount of wood during the first twenty years, and are among the most useful for fuel at this stage. They shoot up very rapidly and getting a fair supply of light make a good trunk development. Being thin-foliaged, these trees do not destroy other kinds that have not grown so rapidly. The European white birch begins to fail and dies at Ottawa at from sixteen to twenty years of age, hence will be removed naturally if not needed for fuel. Individual specimens of Black locust which have done well have probably made as much wood as birch or elm, but they are so subject to borers and sucker so badly that from our experience we should not recommend them for the farmer's plantation.

Basswood is a rapid grower, but was not planted in such a way that we can judge of its usefulness in the farm wood lot.

The trees just mentioned as giving a large amount of fuel early in the history of the forest plantation may be mixed with the white pine, Norway spruce, and Scotch pine, the latter with their denser foliage shading the ground well and killing the side branches of the trees planted for fuel.

To the species already described it is now necessary to add others which will supply good fuel later on and will furnish wood for other purposes.

For fuel we should suggest the hard maple and red oak. The former does not grow as rapidly as any of the trees already mentioned and for the first twenty years will have to endure considerable shade, which it is capable of doing. The red oak has grown rapidly at Ottawa and has held its own with all the species mentioned. While the wood is not considered very valuable for working, it stands fairly high in fuel value.

To the foregoing trees must now be added other species, the wood of which is both high in fuel value and otherwise generally useful for many purposes. The white ash is a rapid growing tree and is very valuable for fuel and for many other purposes and is especially useful to the farmer, as parts of many tools, implements, &c., are made from it. Twenty years after planting it will be large enough to use in various ways, and as it grows older is increasingly valuable.

A few trees of white or bur oak should be in the farmer's plantation, these trees endure shade fairly well and if the planting is planned so that they will get a chance to develop after a few years they will eventually be among the most valuable trees in the plantation.

Black walnut is a good tree where there is thick planting as it shoots up rapidly and as it is a light-needing tree, the side branches which do not get it will die, thus ensuring a clean trunk. Only a few trees are necessary in the plantation as it will be a long time before they will be very useful.

By judiciously mixing the trees which have been mentioned the farmer may have a supply of fuel and wood for lumber and other purposes with little labour in the production of it.

In planting trees we should, from our experience, plant those which are to remain a long time, such as the pines, hard maple, oak, and walnut, at least ten feet apart with others between them.

In the Prairie Provinces the box elder or Manitoba maple is used largely in tree plantations. Our experience has been that being a very rapid grower during the first twenty years and making a very dense top, it is too destructive to other species unless kept down with much labour. Mixed with birch, ash, and American elm which could hold their own it would be useful in shading the ground and killing side branches.

ARBORETUM AND BOTANIC GARDEN.

The winter of 1905-6, owing to the lack of snow was a hard one on trees, shrubs and herbaceous plants and more of these were killed outright than usual. Of trees, 376 species and varieties comprising 403 specimens were killed, and of herbaceous perennials 264 species and varieties. In the spring of 1906, 122 species and varieties of trees and shrubs were added, and 120 of herbaceous perennials. The total number of species and varieties of trees and shrubs alive in the autumn of 1906 were 3,133 represented by 5,701 specimens. There were 1,906 species and varieties of herbaceous perennials alive.

Notwithstanding the winter and the drought during the summer, the Arboretum looked well in 1906.

During the past ten years a number of useful lists have been published of trees, shrubs and herbaceous plants growing in the Botanic Garden.

In 1897 lists were published of *One Hundred of the Most Ornamental Hardy Trees and Shrubs,* and also *One Hundred of the Best Herbaceous Perennials.* In 1898 an *Additional List of Good Perennials was given.* In 1899 a list was published of *Some Good Low Growing Flowering Shrubs,* and also an *Additional List of Good Perennials.* In 1900 there was given a list of the *Best Hardy Woody and Annual Climbers.* In 1901, *A List of the Best Lilacs.* In 1902, *A List of Best Spring Flowering Perennials.* In 1903, *A List of Deciduous Trees, Shrubs and Climbers with Attractive Foliage, Bark and Fruit.* In 1904, *A List of the Genera of Trees and Shrubs in the Arboretum with the Number of Species of Each.* And in 1899 there was published *A Catalogue of the Trees and Shrubs* which had been tested up to that date, with notes regarding hardiness. To these lists is now added *A List of Thirty of the Best Hardy Flowering Shrubs,* most of which have appeared in former lists.

LIST OF BEST THIRTY HARDY ORNAMENTAL FLOWERING SHRUBS.

In selecting a list of thirty of the best hardy ornamental flowering shrubs from the large number which have been tested, several points have been taken into consideration, such as the time of blooming, length of blooming season and the kind of fruit, in addition to the mere attractiveness of the flowers themselves. It was also desirable to not have in the list any species which required winter protection in order to ensure bloom practically every year. In this list are a few shrubby trees. Climbing shrubs are not included.

Berberis Thunbergii.—Thunberg's barberry (Japan). Height, 2 to 4 feet. The best barberry for ornamental purposes. It is a dwarf, compact shrub, with bright, green leaves in summer, changing in autumn to deep red. The flowers while not very striking are attractive. The scarlet fruit is borne very profusely and makes this barberry quite ornamental throughout the winter.

Berberis vulgaris purpurea.—Purple-leaved barberry (Europe). Height, 4 to 6 feet. In bloom, fourth week of May. The yellowish flowers in pendulous clusters make a fine contrast with the leaves which are bright purple, when young, becoming duller later in the autumn.

Caragana arborescens.—Siberian pea-tree (Siberia). Height, 10 to 15 feet. In bloom, third week of May. Flowers, bright yellow and pea shaped. The delicate green leaves of this shrub open very early and are quite attractive throughout the summer. This is one of the hardiest shrubs grown.

Caragana grandiflora.—Large flowered Caragana. (Caucasus.) Height, 4 feet. In bloom third week of May. Flowers large, bright yellow, pea-shaped. Very pretty when in full bloom. This somewhat resembles *C. frutescens,* but has larger flowers. The bush is somewhat pendulous which makes it rather graceful.

Daphne Cneorum.—Garland flower. (Eastern Europe.) Height, 1 to 1½ feet. In bloom second week of May. Flowers bright pink, and sweet scented. A very pretty little evergreen, quite suitable for flower borders. It blooms a second time in autumn.

Diervilla rosea.—Pink-flowered Weigelia, (China). Height 4 to 5 feet. Begins to bloom during the first week of June. Flowers pink. The Weigelias are very well known and are much admired. There are a number of fine varieties, but most of them are too tender and the species is almost too tender to appear in this list, but as a rule it blooms well although somewhat injured by winter. The two hardiest varieties are Eva Rathke, with dark attractive flowers of claret colour, and Sieboldii variegata, with pink and white flowers and leaves handsomely variegated with white and pale green.

Genista tinctoria.—Dyer's Greenweed. (Europe.) Height, 1 to 2 feet. Begins to bloom in fourth week of June. Flowers bright yellow, pea-shaped. A very pretty little shrub, continuing in bloom for some time. There is a double-flowered variety which is also good.

Hydrangea paniculata grandiflora.—Large flowered hydrangea (Japan). Height, 6 to 10 feet. Blooms remain attractive from August until October. Flowers white gradually becoming pink and borne in very large panicles. This is one of the finest hardy shrubs. To get best results the bushes should be pruned back severely every spring and given an abundant supply of water during the growing season.

Hypericum kalmianum.—Kalm's St. John's Wort. (Ontario.) Height, 2 to 4 fee.t Begins to bloom second week of July. Flowers large, bright yellow. A very ornamental shrub, continuing in flower until late in the summer.

Lespedeza bicolor.—(North China and Japan). Height, 4 to 6 feet. This shrub is useful on account of its late blooming. It flowers from late August until it is injured by frost. The flowers are produced in panicles, are pea-shaped and reddish-purple in colour. It is not as graceful a shrub as *Lespedeza Sieboldii*, but is well worth planting. The shrub is usually injured some by winter, but it always blooms profusely.

Lespedeza Sieboldii. (Desmodium penduliflorum). Japan. Height 4 feet. Blooms in September. Although this shrub is killed to the ground every winter, there is usually a profusion of bright purplish-red, pea-shaped blossoms, which are borne in large panicles. This is a very fine autumn flowering shrub.

Lonicera tatarica.—Tartarican honeysuckle, bush honeysuckle (Siberia, Tartary). Height 5 to 10 feet. In bloom third week in May. Flowers bright pink. This is an old favourite and one of the hardiest shrubs grown. There are many varieties of this fine shrub and a large number of hybrids. These vary in colour of flowers from white to rose. Some of them have yellow coloured fruit. Among the best are:—*L. tatarica pulcherrima* with rosy petals, having pink margins; *L. tatarica gracilis,* flowers rosy in bud, pink and rose when open; *L. tatarica speciosa,* flowers large, pink and rose; *L. tatarica splendens,* flowers pink in bud, pink and white when open; *L. tatarica grandiflora rubra,* flowers rosy in bud, rosy with pink margin when open; *L. tatarica elegans,* flowers pure white; *L. tatarica alba grandiflora,* flowers white.

Philadelphus coronarius.—Mock orange or Syringa (South Europe). Height, 5 to 10 feet. In bloom second week of June. Flowers, white, with a strong, sweet odour. A well known, popular shrub. There are several varieties, two of the most ornamental being the golden leaved and double flowered forms.

Philadelphus grandiflorus speciosissimus.—This is a great improvement on *Philadelphus grandiflorus,* with larger, whiter, and more abundant flowers. It blooms in the third week of June. It is a smaller shrub than *P. grandiflorus.*

Pyrus baccata.—Siberian crab (Siberia). Height, 15 to 20 feet. In bloom, third week of May. Flowers, white, tinged with bright pink. This compact little tree bears such a profusion of flowers in spring that it is one of the most ornamental at that time, and later in the summer, when the highly-coloured fruit hangs thickly among the leaves, it is again very handsome. This is one of the hardiest trees grown here.

Pyrus coronaria fl. pl. (Betchel's Flowering Crab).—This is a charming, double flowered variety of the native crab apple which blooms during the fourth week of May. The flowers are large, semi-double and of a delicate shade of flesh pink. They have a very delightful fragrance much resembling that of violets. This tree will probably not grow more than fifteen or twenty feet in height.

Pyrus (Cydonia) Maulei.—Maule's Japanese quince. (Japan.) Height, 1 to 3 feet. In bloom 2nd week of May. Flowers bright red. The flowers of this little shrub are very ornamental, and in the autumn, when the golden coloured, highly perfumed quinces are ripe, it makes a very interesting object. It is much hardier than *P. japonica,* of which some authorities call it a variety.

Ribes aureum.—Missouri currant (United States). Height, 6 to 8 feet. In bloom, fourth week of May. Flowers, yellow and very sweet scented. This currant is quite ornamental, especially when in bloom, and again in summer the fruit, which is quite palatable, makes it attractive at that time.

Rosa ferruginea (rubrifolia)—Red-leaved rose (Europe). Height, 6 feet. In bloom, second week of June. The bright pink flowers of this species are rather small, but the purplish red leaves are very ornamental. This rose does not sucker. Another rose which might be mentioned is *Rosa lucida,* which has glossy attractive green foliage.

Rosa rugosa.—Japanese rose (Japan). Height, 4 to 5 feet. In bloom, second week of June. Flowers, very large and deep pink. This is a beautiful rose with fine flowers and very ornamental leaves which are large, thick and shiny. There is a white-flowered variety which is also good, also a number of hybrids between rugosa and varieties of hybrid perpetual and tea roses, most of which are quite hardy.

Spiræa arguta.—Europe. Height, 3 to 4 feet. In bloom 3rd week of May. Flowers pure white, produced very profusely in compact clusters. This is the earliest flowering spiræa grown here, and is one of the best hardy shrubs of recent introduction. It is a graceful little spiræa with pendulous branches, but its chief beauty lies in the abundance of its pure-white flowers.

Spiræa Japonica alba (S. callosa alba).—White-flowered Japanese Spiræa. Japan. Height 1 foot. Begins to bloom 2nd week of July. Flowers white in flat heads. This is a neat little shrub, and although not altogether hardy, blooms profusely every year and continues in bloom for a long time.

Spiraea sorbifolia. Sorbus-leaved Spiraea (Himalaya to Japan).—Height 4 to 5 feet. In bloom fourth week in June. Flowers, white, borne in very large panicles. This is a strong growing species, but suckers considerably.

Spiraea Van Houttei.—Van Houtte's spiraea (Europe). Height 3 to 5 feet. In bloom first week of June. Flowers pure white, borne very profusely in small, compact clusters on pendulous branches. This graceful shrub is very beautiful when in full bloom. Even when out of bloom its pendulous habit and foliage make it attractive.

Syringa Japonica.—Japanese lilac (Japan). Height, 15 to 20 feet. In bloom fourth week of June and first week of July. Flowers creamy white without much perfume, borne in very large panicles. This is the latest blooming lilac tested here, being more than one month later than the common species. It is a very handsome lilac and being tall and of tree-like habit it is very noticeable.

Syringa Josikaea.—Josika's lilac (Hungary). Height, 5 to 10 feet. In bloom last week of May to first week of June. It blooms immediately after the varieties of the common lilac and continues during the first week of June. It is a strong growing species reaching a height of ten feet or more. The foliage is deep green and the leaves large, thick and very glossy, making it quite attractive irrespective of the flowers, which are bluish purple and have no perfume. This is a desirable species on account of its giving a succession of bloom and because of its fine foliage. It also makes a good hedge plant, forming a stiff row and being very attractive on account of its glossy foliage.

Syringa villosa.—Chinese lilac (North China). This is also a strong growing lilac and is growing taller than at first expected, some specimens being now from 6 to 8 feet high. The leaves are rough and rather coarse-looking, but this tends to make the shrub more striking. It flowers during the second week of June, closely following S. Josikaea. It is a free bloomer and the flowers, which are not highly perfumed, are bluish pink and produced in good sized panicles. This is a very desirable species.

Syringa vulgaris.—Common lilac (Eastern Europe). The common lilac and its varieties bloom during the last half of May, being usually at their best from the 20th to the 27th. If we were confined to recommending one variety which is all that this short list really permits of, the variety Charles X. would be the one chosen. This is an old sort but one of the best, most reliable and cheapest. It is a very free bloomer, the colour of the flowers being of a deep attractive purplish red, borne in large panicles.

There are, however, many fine varieties of the common lilac and from the large collection of 134 varieties at the Central Experimental Farm the following additional kinds are given here as there are many persons who would like an assortment of this popular shrub.

The most satisfactory single white is Alba Grandiflora, a very free bloomer with a large loose truss and pure white flowers. Of almost equal merit three of the best double whites are Madame Casimir Perier, Madame Abel Chatenay, and Obelisque. Of single varieties in the various shades the following are very fine. Congo is about the best of those of the darkest violet or purplish red varieties, the panicles being of good size and the flowers very large. Prof. Sargent and Souvenir de la Ludwig Spaeth are very much like Congo. Other dark coloured single varieties of great merit are Aline Mocqueris and Charles X. Furst Liechtenstein and Jacques Calot are two of the best singles with rosy lilac flowers, and Lavaniensis is almost a pure pink. Dr. Maillot is a fine late variety. Two of the deepest coloured and best double varieties are Charles Joli and La Tour d'Auvergne, both being dark reddish purple or violet purple. A great deal of the charm of many of these newer varieties is in the contrast of the colour of the flowers still in bud with those fully open on the same panicle. The varieties that are particularly attractive in bud, the buds having a rosy appearance are, Charles Baltet, Michael Buchner, de Jussieu and Prince de Beauveau, all very fine sorts. The last named variety has a bluish tint when open, making the contrast between bud and open flower very striking. Two varieties that are of particularly fine shades of lilac are Leon Simon and Comté Horace de Choiseul. Three other excellent varieties that are bluish when open are: Abel Carriere, Condorcet and Boussingault. Linne is a very fine variety with twisted petals.

Some of the best double varieties of more or less pink or rosy colour in bud or flower are Emile Lamoine and Jean Bart, of which, although mentioned last, at least one should not be omitted from the general collection. Taking into consideration the range of colour we should select as the twelve best: Alba Grandiflora, Madame Casimir Perier, Congo, Prof. Sargent, Furst Liechtenstein, Lavaniensis, Charles Joli, Charles Baltet, Leon Simon, Abel Carrier, Charles X. and Emile Lemoine.

Viburnum Lantana.—Way-faring tree (Europe). Height, 8 to 12 feet. In bloom third week of May. Flowers white in compact flat heads. The fruit is very ornamental, being scarlet, turning to dark purple when ripe.

Viburnum Opulus.—Guelder rose, high bush cranberry (Canada). Height, 6 to 8 feet. In bloom second week of June. Flowers, white, in large clusters. This is, at all seasons of the year, an ornamental shrub, as the abundant bright scarlet fruit remains on the bush all winter.

Viburnum Opulus sterile.—Snowball. Height 8 to 10 feet. In bloom second week of June. The almost round clusters of pure white flowers of this shrub are well known. This is one of the most ornamental hardy flowering shrubs, but during the past few years it has been badly attacked by aphis. To destroy these it is necessary to spray the bushes just as the buds are breaking in the spring. This is very important as at this time the eggs are hatching. A second spraying should be given in a few days, and while the leaves are still only partly expanded. Once the insects cause the leaves to curl it is almost impossible to get at them. Kerosene emulsion or whale oil soap may be used for spraying.

REPORT OF THE CHEMIST.

FRANK T. SHUTT, M.A., F.I.C., F.C.S., F.R.S.C.

OTTAWA, April 1, 1907.

DR. WM. SAUNDERS, C.M.G.,
Director, Dominion Experimental Farms,
Ottawa.

SIR,—I have the honour to submit herewith the twentieth annual report of the Chemical Division of the Experimental Farms.

It contains an account of the larger number of the more important researches undertaken during the past sixteen months, the last annual report being dated December 1, 1905. A perusal of its pages will show that our field of work has been a wide one and that practically every branch of Canadian agriculture has received some assistance of a chemical nature.

There is on all sides strong evidence that the work of the experimental farms is being more and more appreciated and valued as it becomes better known, and in this connection we feel gratified to note the wider recognition of the value of chemical investigations accorded by the intelligent, practical farmer. The increased correspondence and the larger number of samples submitted to us for examination may, I think, be accepted as indications of the correctness of this conclusion.

The number and nature of the samples received for analysis from the various provinces are given in the following table:—

SAMPLES Received for Examination and Report November 30, 1905, to April 1, 1907.

Sample,	British Columbia.	Alberta.	Saskatchewan.	Manitoba.	Ontario.	Quebec.	New Brunswick.	Nova Scotia.	Prince Edward Island.	Total.	Number still awaiting examination.
Soils	85	46	62	32	69	49	3	80	2	428	88
Muds, mucks and marls	4	..	......	1	2	7	6	11	8	39	11
Manures and fertilizers	5	.....	1	3	20	14	5	28	1	77	1
Forage plants and fodders	18	6	13	16	466	22	13	22	......	576	45
Well waters	15	14	28	26	121	42	24	6	5	281	......
Miscellaneous, including dairy products, fungicides and insecticides	16	13	13	30	134	58	11	14	9	298	14
Totals	143	79	117	108	812	192	62	161	25	1699	159

During the past year several important investigations relating to dairying have been carried on and the results published in bulletin form. They appear as bulletins No. 13, 'A Critical Study of the Sweet Cream Butter-Making Process,' and No. 14, 'Apparatus for the Determination of Fat and Water in Butter,' Dairy Division, New Series.

We have reserved for future publication data obtained in connection with certain researches now in progress, in order that the results may be presented in a more completed form than is now possible. Among these investigations the following may be mentioned as some of the more important: The cause of the deterioration of wheat when grown on freshly cleared scrub land in the Northwest; the chemistry of wheat as related to its baking strength; the composition of Canadian barleys; the etxent to which land is affected by a system which comprises grain growing and occasional fallowings; the amount and availability of plant food in the soils of the semi-arid belt of British Columbia; the reclamation of muck soils; the examination of *Senecio jacobœa* (ragwort), the alleged cause of the Pictou cattle disease, for a poisonous principle; the chemistry of the potato; the fertilizing elements in rain and snow.

It is again with much pleasure that I record my thanks to Mr. A. T. Charron, M.A., and Mr. H. W. Charlton, B.A.Sc., assistant chemists, for much valuable help in connection with the work of the division. To them is due the credit for the larger amount of the analytical data contained in this report. In addition to laboratory work, Mr. Charron, as for some years past, has lectured in French at a considerable number of farmer's institute meetings and conventions on agricultural matters in Quebec and the Maritime Provinces. These addresses have been acknowledged of great educational value.

To Mr. J. F. Watson also, I would extend my thanks for the very efficient help he has given in connection with the clerical work of the division.

I have the honour to be, Sir,
Your obedient servant,
FRANK T. SHUTT,
Chemist, Dominion Experimental Farms.

THE CONTROL OF MOISTURE IN ORCHARD SOILS.

The continuance of this investigation on the Central Farm during the season of 1906 comprised observations from two series of plots, estimations of the soil moisture being made from July 18 to September 27. July was marked by an exceedingly scanty precipitation—a comparative drought. When this had continued into the third week, it was determined to ascertain the effect of this extreme dryness on the soil under various conditions, for experience has shown that it is under such circumstances, that the beneficial effect of cultivation and mulching and the exhaustive effect of sod and weeds, are more especially pronounced. The data obtained are strongly confirmatory of many we have obtained in previous seasons and serve to emphasize more particularly the value of mulching as a means of conserving soil moisture. The further fact is also brought prominently before us, that allowing weeds to grow and obtain possession of the land dries out the soil practically to the same extent as does sod.

The exceptional drought obtaining during July, at Ottawa in 1906, and to which we have referred, is well shown in the data of the following table, in which we have given the precipitation at Ottawa for the three summer months from 1896 to 1906, inclusive.

RAINFALL AT OTTAWA.

	1896.	1897.	1898.	1899.	1900.	1901.	1902.	1903.	1904.	1905.	1906.	Aeragve.
June	3·43	3·01	2·06	2·97	3·83	2·84	4·19	7·3	2·80	4·63	4·85	3·81
July	3·03	5·19	2·87	9·85	6·45	2·25	4·03	4·0	3·31	4·76	1·58	4·30
August	3·91	3·40	3·22	·38	2·34	6·16	1·82	4·31	2·80	4·07	2·43	3·21
Totals	10·37	11.60	8·15	13·20	13·12	11·25	10·04	15·61	8·91	13·46	8·86	11·32

From these figures we find that last season, though June had one inch more rain than the average, July was 2·72 inches and August ·78 inches below the average for these months, so that the total precipitation for the three months was 2·46 inches less than the average. July had the lowest record in eleven years.

Series I. Comprised 3 plots side by side in the plum orchard. The first plot or strip was in what might be termed permanent sod, that is, it had been established for a number of years. The second strip was cultivated three times during the early part of the summer. The third plot carried mulching material, put on to kill bindweed, to a depth of from 6 to 8 inches. This material was corn stalks, asparagus tops, old hay, &c. The soil of this part of the orchard is light and sandy.

Plot 1.—At the time of the first collection of samples there had been a period of almost three weeks of extreme dryness and many crops were showing signs of suffering. The soil under the sod (Plot 1) was almost like powder; there was practically no cohesiveness between its particles. The grass had formed a thick tough sod and the growth of grass made in the spring had been cut on June 9. This mowing was not at all severe, that is close, and the cut grass (a light crop) was not raked off. This of course soon dried into hay, but as it had not been spread evenly over the cut area—and further was too light to act as an efficient mulch, it is not a matter of surprise to find that it had had no effect in checking evaporation. The data show but 3·65 per cent water—an amount frequently exceeded in laboratory air-dried soils, and certainly very much lower than the minimum requisite for satisfactory crop growth—or indeed in many instances for the maintenance of plant vitality. The heavy loss of moisture that had taken place was not entirely caused by the transpiration of the grass, but was no doubt largely due to surface evaporation, which had been increased by the establishment of capillarity. In undisturbed soil, bearing a crop, as for instance that in sod or upon which grain is growing, the loss of moisture from this cause is usually much greater than that by a transpiration of the crop—and especially is this true of loams containing much coarse sand.

Two weeks later, August 1, the moisture content was 5·03 per cent. As on the day previous to the collection of the sample there had been a rainfall of ·6 inch, the increase over that present in the soil on the 18th is readily understood.

On August 15, the date of the third collection, this soil contained 3·79 per cent water—an amount practically identical with that of six weeks earlier. The losses by evaporation and transpiration we may therefore suppose had been supplied by water drawn from lower depths than 14 inches and by rainfall—and thus in a large measure an equilibrium maintained. That evaporation from the surface of the soil rather than transpiration through the foliage was the chief cause of loss of moisture is, I think, made clear from the fact that the grass was not functionally active—that is, was not making any appreciable growth—practically during the whole period of this investigation.

SERIES I.—Conservation of Soil Moisture, C. E. F., Ottawa, Ont., 1906.
(Samples collected to a depth of 14 inches.)

Date of Collection.	Rainfall.	PLOT 1.—IN SOD.			PLOT 2.—CULTIVATED.			PLOT 3.—MULCHED.		
		Water.			Water.			Water.		
		Per cent.	Per acre		Per cent.	Per acre.		Per cent.	Per acre.	
	Inches.		Tons.	lbs.		Tons.	lbs.		Tons.	lbs.
July 18..........	0·43*	3·65	77	1473	7·74	172	304	11·51	266	1821
August 1..........	1·15	5·03	103	1052	11·04	254	1318	11·62	269	1593
„ 15..........	0·93	3·79	80	1671	10·77	247	1358	10·80	248	905

* Precipitation from July 1 to July 18.

Plot 2.—Previous to the date of the first collection this plot had received, after the discing at the opening of the season, only one cultivation, namely: about the middle of June. The soil therefore had been undisturbed for several weeks during a very hot and dry period when the samples were taken for analysis on July 18. The percentage of moisture found (7·74) was decidedly low, though twice as large, as that in plot 1, in sod. No doubt a large loss through evaporation had occurred during the first part of July, an amount which might have been materially reduced by constantly stirring the soil.

From this time on till the close of the experiment the moisture content of the soil was practically maintained at 11 per cent by cultivation. There naturally had been surface evaporation, but this had been kept in check, so that the loss from this cause had been made up by water drawn by capillary attraction from lower depths aided by the scanty rain that had fallen in this period.

Comparing plots 1 and 2, we learn that in the latter (the cultivated land) there was approximately 100 tons more water per acre in the first 14 inches of soil than in the former (plot in sod), in the middle of July. Subsequent to this date the difference in water content of these two plots was even greater—due to more frequent cultivation of plot 2 and the ever increasing tendency of plot 1 to lose water. These differences were approximately, per acre, as follows: August 1, 150 tons; August 15, 167 tons.

Plot 3.—In order to kill out bindweed, that had taken possession of the soil, this plot had been heavily mulched in 1905 with refuse consisting of corn stalks, asparagus tops, old hay, &c., the depth of material being about six inches.

The data show that a mulch of this character is fully as effective as one of earth (by cultivation) for conserving moisture. This conclusion is in accord with that we reached some years ago, using straw as a mulch. The question of relative expense is one that must be settled by each fruit grower for himself—the price of labour and the cost of mulching material are the two largest factors to be taken into consideration. No doubt in many localities mulching would be cheaper than cultivating. One objection to the mulching system in certain districts would be that in order to induce ripening of the wood towards the latter part of the season it would be necessary to dry out the soil somewhat and to do this the mulch would have to be taken off, entailing expense. Another possible objection, but one upon which I can advance no evidence, would be that mulching tends to keep the roots of the trees near the surface and thus render them liable to injury during the winter.

Series II.—This consisted of three plots among a number in an orchard set out in the spring of 1906 by the horticulturist and so arranged as to illustrate the effect of various plans of soil management upon the growth and development of the young apple tree. The soil though of a sandy character was much better than that of Series 1, being richer in humus.

SERIES II.—Conservation of Soil Moisture, C. E. F., Ottawa, Ont., 1906.

(Samples collected to a depth of 14 inches.)

Date of Collection.	Rainfall	PLOT A.-UNDISTURBED.			PLOT B.--CULTIVATED TILL JULY 30, THEN SEEDED TO RAPE.			PLOT H.-CULTIVATED.		
		Water.			Water.			Water.		
		Per cent.	Per acre.		Per cent.	Per acre.		Per cent.	Per acre.	
	Inches.		Tons.	lbs.		Tons.	lbs.		Tons.	lbs.
July 18............	0·43	7·53	157	1055	14·27	323	208	....		
August 1..........	1·15	8·42	178	937	14·67	333	1553	....		
" 15..........	0·93	6·70	139	788	14·37	325	1496	....		
" 29..........	1·50	10·20	220	965	12·71	282	1277	14·34	324	1908
September 9........	0·26	6·07	125	879	6·70	139	788	13·52	303	934
" 27.......	0·69	7·36	154	432	7·16	149	1426	13·41	300	1232

Plot A was left undisturbed and the soil was soon fully occupied by weeds. These were cut, but not closely, on August 24 to prevent seeding. The first moisture determination (July 18) showed that the growth of the weeds had very markedly dried out the soil, though not to the same extent as the sod in Plot 1, Series I. Compared with Plot B, adjoining and which was kept cultivated, it contained at this date 166 tons less water per acre, calculated to a depth of 14 inches.

Two weeks later (August 1) the moisture content was somewhat higher—about nine-tenths of a per cent, but this increase was undoubtedly due to the rainfall (approximately ·7 in.) two days previous to the collection of the sample. On August 15 the percentage of water had fallen to a point lower than at any previous date, viz. 6·70 per cent. The soil taken on August 29 showed 10·20 per cent water. This increase is explained by the fact that the weeds were now functionally inactive, practically dead, and that during the preceding nine days rain had fallen to a depth of 1½ inches.

The dryness of the soil on September 9 and 27 is significant (6·07 per cent and 7·36 per cent respectively). The weeds were not now making any great demand on the soil's moisture, but nevertheless a loss of water was taking place. This was a result of the undisturbed capillarity and surface evaporation—which, as we have before remarked, may be as potent a factor in the loss of water as a growing crop.

Plot B affords some interesting and instructive results. It was kept cultivated till July 30, when it was seeded to rape. Its moisture content remained constant (approximately 14 per cent) so long as it was cultivated, but as soon as the rape attained a fair growth it began to exhaust notably the soil's store of water. This and surface evaporation reduced the moisture content to amounts practically identical with those of Plot A, as determined on the two last dates of the investigation. This furnishes evidence as to the value of rape as a cover crop when it is desired to dry out the soil and then hasten the ripening of the wood of the trees before winter sets in.

Plot H.—This was cultivated until August 1, but unlike Plot B, bore no crop subsequently. The first sample was taken for analysis on August 29 as the data compared with those of Plot B would show what loss in the latter had ensued from sowing the rape. Although the rainfall from this date till the close of the investigation was light, this plot held its own, or practically so, the percentage of water being between 13 and 14. The deduction from these results is that if it is desired to dry out the soil to any considerable degree it is necessary to sow a cover crop. It will be noticed that it contained 150 tons more water per acre than Plot B. But yet both plots had received exactly the same amount of cultivation and on the same dates. The difference therefore must have been owing to Plot B carrying the crop of rape while Plot H had been free of vegetation.

PRELIMINARY REPORT ON SURFACE SOILS FROM THE ABITIBI REGION.*

This series of soils, comprising thirteen samples, was forwarded to the laboratories of the Experimental Farms, Ottawa, during the first half of the year 1905. The dates of their reception and the localities from which they were collected are given in the subjoined table, which also presents the analytical data obtained. The soils are arranged in the order in which they were received.

A brief description of the soils from a preliminary examination, chiefly physical and microscopical, may be given as follows:—

1. Yellowish white clay, with very little sand, and practically destitute of organic matter. Reaction: very slightly acid. Traces of lime.

2. Greyish-white clay, with fair amount of coarse sand and some pebbles. A little root fibre. Reaction: slightly acid. Traces only of lime.

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* Collected and forwarded by Mr. Frank Moberly, C.E., of the engineering staff of the Transcontinental Railway.

3. Greyish clay loam, with very little sand. Some few fragments of root fibres. Reaction: slightly acid. Traces only of lime.

4. Dark clay loam. Apparently rich in organic matter and showing plenty of root fibre. Very little sand. Reaction: slightly acid. Traces only of lime.

5. Reddish clay, containing some sand. Apparently has been burnt over (?). No visible signs of organic matter. Reaction: acid. Traces only of lime.

6. Dark-grey clay loam, apparently rich in organic matter. Showing plenty of root fibre. Very little sand present. Reaction: acid. Lime in traces only.

7. Greyish-white clay, showing only traces of organic matter. Very little sand. Reaction: neutral. Lime in traces only.

8. Dark-grey clay loam, with fair amount of organic matter. Very little sand. Reaction: neutral. Traces only of lime.

9. Dark-grey clay loam, showing some root fibre. Small quantity of sand. Reaction: neutral. Traces only of lime.

10. Greyish-brown clay loam, containing some root fibre and a little sand. Reaction: acid. Traces only of lime.

11. A grey clay apparently rather poor in organic matter, but with fair quantity of root fibre. Reaction: neutral. Lime in traces or small amount.

12. Greyish-white clay. Very little root fibre and apparently traces only of organic matter. Reaction: slightly alkaline. Should judge it to be rich in lime.

13. Greyish-white clay loam. Showing some root fibre. Very little sand. Reaction: very slightly acid. Lime in traces only.

Considered as a class, these soils are to be regarded as clay loams. Many are 'heavy' or 'strong' clays. With the exception of Nos. 2 and 5 the amounts of sand are almost negligible, though in most of them there is a fair amount of undecomposed feldspar particles, which to a certain degree may serve the same physical purpose as sand.

ANALYSIS OF THE SOILS.

In the preparation for analysis, the soils were first dried by exposure to the air. They were then gently crushed and any root fibre, pebbles, &c., separated by sieves. The analysis was made on the fine earth.

ANALYSIS OF SOILS (air-dried) from Abitibi Region.

Number.	Date of Reception.	Designation.	Moisture.	Organic Volatile Matter.	Nitrogen.
1	17-2-05	Obadagwashing Lake	1·02	3·35	·024
2	27-3-05	North shore of Abitibi Lake	0·35	1·60	·041
3	27-3-05	South shore Abitibi Lake, near H. B. Post	1·14	5·40	·121
4	27-3-05	Agotawekami Lake, 12 m. S. of Abitibi	5·07	16·85	·459
5	22-4-05	10 m. N. Abitibi, S. of Sta. 2061½ m.	6·58	11·26	·167
6	22-4-05	10 m. N. Abitibi Lake	6·11	21·51	·435
7	2-6-05	Makamik Lake, N. of Abitibi	3·62	4·68	058
8	2-6-05	Whitefish River, N. of Abitibi	4·41	12·82	·212
9	3-6-05	Upper Okikodasik River, 10 m. N. Lake Abitibi, about boundary between Ontario and Quebec	3·62	9·72	·226
10	3-6-05	N. of Lower Abitibi Lake, Ontario	3·47	7·35	·156
11	13-6-05	From field cultivated by H. B. Co. for many years, H.B. Post, Abitibi	2·07	9·39	·245
12	21-6-05	From Island, Abitibi Lake	3·56	9·06	·058
13	26-6-05	Whitefish River, 3rd Rapid, Abitibi	4·03	7·09	·118

We are probably quite safe in assuming that the nitrogen content of these soils is a fair measure of their crop-producing powers. On this basis, Nos. 4 and 6 are to be placed at the head of the list. They should prove excellent soils and very fertile if properly cultivated.

Following these come Nos. 8, 9 and 11, with a nitrogen content of between 0·2 per cent and 0·3 per cent. These are very probably soils capable of producing remunerative crops, for as far as our data go they compare very favourably with many Canadian virgin soils that have shown themselves good farming lands.

The third division comprises those soils containing between 0·1 per cent and 0·2 per cent nitrogen. These are Nos. 3, 5, 10 and 13. Though somewhat deficient in organic matter (humus) and nitrogen, they are still fairly good soils and no doubt would improve under a good system of farming.

The remainder, Nos. 1, 2, 7 and 12, must be considered as below the average and would require enrichment before they could be expected to give their maximum returns.

As a class, these soils are all 'retentive' and 'lasting,' and the majority of them under skilful treatment suitable for most of our farm crops. In their cultivation it would be highly desirable to adopt a rotation that kept up, and indeed increased, their humus and nitrogen content. This can best be done by the growing of clover or some other legume in the rotation and by the keeping of stock. They are all soils that will repay thorough drainage and, with the exception of No. 12, an occasional application of lime. Owing to the large proportion of clay they contain, much will depend upon the manner of cultivation. To prevent 'puddling,' they should never be worked while wet.

In conclusion, it must be stated that as yet the analyses are incomplete; consequently this report should only be regarded as tentative in character. From the writer's long experience, however, in the examination of Canadian soils he feels justified in making the deductions here given regarding the character and probable productiveness of these soils.

PEASE AS A FERTILIZER IN THE NORTHWEST.

The enrishment of soils through the turning under of the legumes is a subject that has been studied in the fields and laboratories of the Experimental Farm for a number of years past, and our results, published in the annual reports and special bulletin, show the value and economy of this method for the maintenance of soil fertility. The crops hitherto investigated as useful for this purpose of furnishing humus and nitrogen comprise the clovers—common red, mammoth red and crimson; vetches, hairy and black; alfalfa; horse beans and Soja beans. Of these, the clovers and alfalfa are pre-eminently the legumes most serviceable as soil enrichers.

In tilling the soil a certain dissipation of the nitrogen is unavoidable. Plowing, harrowing and indeed all mechanical operations that tend to open up the soil, must result in the oxidation and, consequently, the loss of a portion of the humus (semi-decayed vegetable matter) and its concomitant, nitrogen. Especially is this true of fallowing, by which undoubtedly more nitrogen can be lost than is removed by the following crop. This fact was well established two years ago from the analyses of a series of soils—virgin and cultivated—collected in the Northwest Territories. Fallowing is most useful in keeping the land comparatively free from weeds; it liberates plant food and undoubtedly performs an important function in storing moisture for the succeeding crop, but there is no gainsaying the fact that it is a wasteful practice as regards soil fertility. Data to substantiate this statement were given in the report of this division for 1905, where it was pointed out that if the present productiveness of the soils of the northwestern provinces was to be maintained attention must be given, and this before the soils become markedly exhausted, to the return of humus-forming material rich in nitrogen. This of course does not refer to all soils in the Canadian Northwest, many of which are at the outset over-rich in organic matter and nitrogen, leading rather to rankness of straw than to development of grain. But it is applicable to many areas which have now been growing cereals for the past 20 or 25 years, without any manure and without a single season of sod to return vegetable matter, and which moreover have every third year or so been put in fallow. Such soils, in spite of their great initial, inherited richness, are showing signs of decline, and unless some remedial steps are taken, will continue to do so. All this may serve to emphasize the desirability of abandoning, where practicable, the system of continuous grain growing and substituting therefor a rotation in which at least one member shall add to the soil's store of humus and, if possible, nitrogen.

The value of Brome grass in this connection has been well brought out by experiments conducted on the Experimental Farms at Indian Head, Saskatchewan, and Brandon, Manitoba, a crop which not only adds humus, but which (though disliked by many owing to difficulty in eradication) undoubtedly is of great service in supplying a fibre that binds and holds the soil, thus preventing to a large degree the drifting and loss of the surface soil under high winds. Inquiry shows that loss of soil from this cause is common in many districts, the drifting being quite pronounced even on heavy clay loam after the latter has been worked for a number of years, and drifting is largely a result of fallowing.

The last three or four years there has been an intelligent and persistent attempt on the part of some farmers in Manitoba to grow clover, and these efforts have in many instances proved successful. A general impression prevailed that owing to insufficiency of moisture or the severity of winters or other untoward conditions, clover could not be grown in the Northwest, but the evidence is now ample that clover and alfalfa can be grown in many parts of the northwestern provinces. On the Experimental Farms at Brandon, Manitoba, and Indian Head, Saskatchewan, both of these crops have been raised successfully for a number of years past, and this frequently in spite of comparatively light snowfalls to protect the crop during the first winter. Mr. Bedford, late superintendent, Experimental Farm, Brandon, wrote in 1904: 'As usual a number of the hardiest clovers have wintered here and given a fair return of fodder. The plan usually followed in the eastern provinces of sowing clover seed with a nurse crop has always proved a failure on this farm, our heavy crops of grain so completely shade the ground that the clover plant has no opportunity of developing and is too small and weak to withstand the severe winter. The system adopted here is to plough grain stubble land in May or early in June, harrow once, sow the clover seed broadcast, then harrow a second time and roll. When the weed and volunteer crop are up about one foot high, a mower is run over the land and the cuttings left on the ground as a mulch. By autumn the clover plants are, by this plan. commonly about two feet high, well rooted, and they usually pass the winter without loss.'

PEASE AS A SUBSTITUTE FOR CLOVER.

Notwithstanding the possibility of clover growing the inquiry is frequently made by farmers in the Northwest, is there not some other legume that can be used for keeping up the soil in the place of clover, one that will make its growth in the season of seeding so that winter killing would not enter into the calculation, one that by plowing under at the end of the season would furnish the soil with large quantities of humus-forming material and nitrogen? May not pease fulfil these requirements? It is a fairly quick growing annual, a nitrogen gatherer, and one that will give a good yield if climatic conditions are at all favourable. In districts where the storing up of soil moisture for the succeeding crop is not necessary, the pease might be sown in the spring and the growth be found to make sufficient cover to keep down the weeds. Possibly a modification of this procedure that might be desirable in some districts would be to fallow the land for one month, say till the middle of June, and then sow the pease. Though undoubtedly the pease would make a considerable draft on the soil moisture, this loss would be reduced as soon as the pease had made sufficient growth to cover the land. The dense mat of foliage forms a very effective shade and protection from the sun and drying winds. With eight weeks' growth the writer is of the opinion that on the larger number of the soils of the Northwest and under the climatic influences that are there wont to prevail, there would be a very good crop to turn under. At present we have no data obtained in the Northwest to record, but an experiment was conducted in the orchards of the Central Farm, Ottawa, last season, which has yielded most promising results. Advantage was taken of the fact that the Horticulturist had sown pease for a 'cover' crop, to collect, weigh and analyse the foliage and roots (taken to a depth of 9 inches) on a certain area and to compute therefrom the amounts of vegetable matter and the various fertilizer constituents contained in the pease per acre.

PEASE FROM C. E. F. ORCHARD.

Sown, May 27. Collected, July 26.	Foliage per Acre.		Roots per Acre.	
	Tons.	lbs.	Tons.	lbs.
Yield per acre	12	1,013	1	1,132
Dry matter		3,376		472
Organic and volatile matter		3,010		412
Ash		366		60
Insoluble ash		119		37
Phosphoric acid		32		3
Potash		149		6
Nitrogen		119		10

It will be remarked that the collection was made exactly two months from the date of sowing, at which time the crop was just past the height of its flowering—probably the best period at which to turn under. The crop went 12½ tons to the acre, showing that a good growth had been made.

Though the root system is by no means extensive, which it is to be admitted is a feature that renders this crop less valuable for this purpose than alfalfa and some of the clovers, there is a very large amount of vegetable matter and of the chief elements of plant food to be returned for the improvement of the soil when the whole crop is turned under. With respect to the nitrogen—approximately 130 lbs. per acre—we are unable to say exactly what proportion has been obtained from the atmosphere, but as pease like all the legumes draw very largely from this source through the agency of bacteria upon their roots, we may conclude that as in the case of the other members of that soil-enriching family, the greater part of it has been so derived. The significant fact is that this amount—130 lbs. per acre—is practically identical with that which we have found contained in alfalfa, vetches and many of the clovers, so that in this particular it should have an equal fertilizing value to those crops, and considerably greater than that of horse beans, soja beans and some other of the legumes we have examined from this point of view.

We likewise find that the organic matter is practically equivalent to the quantity in a good clover crop, though somewhat less than that in one of alfalfa. Thus in humus forming material pease would occupy a high place among crops grown to replenish this valuable constituent.

The mineral elements—phosphoric acid and potash—have, of course, been obtained from the soil, but in the subsequent decay of the pease these are set free in more or less easily assimilable forms for succeeding crops, and this in a measure may be considered as increasing the store of fertility in the soil. The large amount of potash contained in the pease is to be noted.

FERTILIZING MATERIALS.

DOG-FISH SCRAP AS A FERTILIZER.

At intervals during the past year we have undertaken to examine and report upon samples of dog-fish scrap and dried fish offal for the Department of Marine and Fisheries. These were forwarded from the dog-fish reduction works at Canso, N.S., and Shippigan, N.B., at which places there is now a considerable accumulation of this fertilizer, chiefly obtained from the rendering or so-called reduction of dog-fish. This fish, a species of shark, by reason of its voraciousness and the fact that it is present in Atlantic waters in large numbers, has become a serious menace to fisheries on the east coast. To protect the fisheries the Federal Government accordingly offered a bounty for the capture of this pest and, to utilize to the best advantage the fish thus brought in, established the above mentioned works. In this way large quantities both of oil and of a rich nitrogenous fertilizer have been prepared. It is this latter by-product that has been submitted to us to determine its agricultural value.

The first samples of fish scrap were received on October 3, 1905, from the Dog-fish Reduction Works, Canso, N.S., marked as follows: No. 1. Fish Offal, September 10; No. 2. Dog-fish Scrap (wood dried), September 26; No. 3. Dog-fish Scrap (coal dried), September 22.

No. 1. Fish Offal.—This, I presume, is not from the dog-fish, but is the dried refuse obtained in the cleaning of fish—cod, haddock, &c., for drying or salting.

It contained a large quantity of coarse bone, many fragments being from 1 inch to 1½ inches in length, and is, therefore, not suitable for direct application to the soil. A mechanical separation showed 71 per cent granular material and 29 per cent coarse bone. This scrap would, I think, require grinding before it could be put on the market either for farmers' use or for the manufacture of commercial fertilizers. From the agricultural standpoint much importance must be placed upon the fineness of the material, as in a very large measure this factor determines the relative availability of the plant food constituents in the scrap. The finer the material, other things being equal, the more ready the decay of the scrap in the soil, and consequently the more quickly are the fertilizing elements offered in suitable forms for crop use.

Analysis.

Moisture	11·07
Nitrogen	8·43
Phosphoric acid	9·01
Total mineral matter	24·15
Mineral matter insoluble in acid (sand, &c.)	·93
Oil	5·47

These data indicate a scrap of excellent quality, both as regards percentage of nitrogen and phosphoric acid and comparatively low oil content.

In the United States large quantities of Menhaden (a coarse sort of herring) are used in the manfacture of scrap, and this, with a moisture content of, say, 10 per cent, will contain, as a rule, from 6 to 8 per cent nitrogen, and 6 to 7 per cent phosphoric acid. It is evident, therefore, that this Canadian product compares well in composition with the raw material so largely used by the fertilizer manufacturers as a source of nitrogen and phosphoric acid.

No. 2 and No. 3. Dog-fish Scrap.—These are very similar in appearance, being considerably finer than No. 1, though containing some coarse bone and meat fragments. Both are decidedly oily to the touch and sight. For the fertilizer manufacturer they would be classified as 'coarse,' and would receive a lower valuation for nitrogen and phosphoric acid than if finer. For direct application, as by farmers, grinding would not, perhaps, be necessary.

Analysis.

	No. 2. Dog-fish (wood dried).	No. 3. Dog-fish (coal dried).
Moisture	14·90	12·18
Nitrogen	7·59	7·63
Phosphoric acid	2·94	2·90
Total mineral matter	7·05	7·29
Mineral matter insoluble in acid (sand)	·16	·43
Oil	31·47	32·75

The percentage of nitrogen in these scraps is very satisfactory. The very low percentage of phosphoric acid is due to the fact that the dog-fish has not a 'bony' skeleton but belongs to a group of fishes (the Selachians) in which cartilage very largely replaces phosphates of lime.

Both these scraps possess very high percentages of oil. Oil is not plant food and its presence in excessive amounts prevents the decay of the scrap in the oil, and hence retards the liberation of its plant food constituents in available forms. Further, the continued and excessive application of a fertilizer so rich in oil might work serious injury to the proper physical condition of the soil. Possibly some modification in the process of manufacture may be devised whereby a larger portion of the oil may be removed. Whether a further extraction of oil from the scrap by naphtha (gasoline) could be made, without entailing undue expense, I am at present unable to say, but my opinion is that from the agricultural standpoint it is highly desirable that a scrap poorer in oil be prepared.

The analysis of the fourth sample of dog-fish scrap, forwarded November 11, 1905, furnished the following data:—

Moisture	20·28
Nitrogen	7·95
Phosphoric acid	2·36
Total mineral matter	6·71
Mineral matter insoluble in acid (sand, &c.)	·35
Oil	28·49

This sample is not so dry as those received on October 3. In nitrogen it is a little richer, but in phosphoric acid it is somewhat lower, pointing to a slightly larger proportion of flesh, cartilage, &c., and concomitantly less bone than in the former samples. Presumably it is entriely the refuse from dog-fish.

Although it was stated that the livers were excluded when making this scrap, the amount of oil present does not fall far below that in the scraps previously examined.

Fish-scrap Liquor.

In the preparation of the scrap a considerable amount of liquor is expressed from the cooked dog-fish which after yielding the greater part of its oil is allowed to run to waste. To learn what fertilizer value this liquor might possess a sample forwarded in January, 1906, was submitted to analysis and the following results obtained:

Dry matter	11·19
Water	88·81
	100·00
Ash	1·03
Nitrogen	1·69
Oil	4·33

Leaving out of consideration the value of the phosphates in the ash and that of the oil present, the liquor should be worth saving for its nitrogen, which amounts to approximately 34 lbs. per ton.

Fish-scrap from Shippigan, N.B.

Three samples of fish-scrap were received on December 12, 1906, from the Dog-fish Reduction Works, Shippigan, N.B., marked as follows:—

No. 1. Dry, mixed dog-fish and offal.
No. 2. Pure dog-fish scrap.
No. 3. Oily, mixed dog-fish and offal.

Analysis.

	No. 1.	No. 2.	No. 3.
Moisture	3·12	4·81	4·27
Nitrogen	8·13	9·41	8·13
Phosphoric acid	6·49	3·77	3·97
Total mineral matter	17·38	10·29	10·51
Mineral matter insoluble in acid (sand, &c.)	·51	·67	·30
Oil	25·38	22·81	31·77

These have all been well dried, the percentage of water being decidedly lower than in the samples previously examined. This, naturally, would tend to increase the percentages of the other constituents, including those of fertilizing value, nitrogen and phosphoric acid.

The nitrogen-content of Nos. 1 and 3 is the same, and slightly higher than that of the dog-fish scrap from Canso reported on in December, 1905. The proportion of nitrogen in No. 2 exceeds that of No. 1 and No. 3 by about 1¼ per cent and must be considered as extremely satisfactory.

The phosphoric acid, it will be noted, in Nos. 2 and 3 lies between 3¾ and 4 per cent. This is almost 1 per cent higher than found in the former samples of dog-fish scrap. No. 1 contains practically 6½ per cent phosphoric acid, decidedly more than the other samples. This, I presume, is due to the presence of bones from other fish in this sample—a conjecture which received confirmation from the much larger percentage of mineral matter (chiefly bone) it contains.

All are notably free from sand and other inert matter of similar character.

The data indicate a large amount of oil in this dog-fish scrap, though in this respect Nos. 1 and 2 show a distinct improvement on similar scraps from Canso, analysed in December, 1905, the reduction of this constituent being from 6 per cent to 10 per cent. No. 3 contains practically the same percentage of oil as the samples of 1905.

The Use of Fish-scrap on the Farm.

The following formulae are offered to meet inquiries respecting the use of this dog-fish scrap. Necessarily they cannot be regarded as giving the best proportions for all classes of land, but they will be helpful to those who have had no experience in the home-mixing of fertilizers.* They would result in a complete fertilizer, *i.e.*, one furnishing all three of the essential elements of fertility, and such a fertilizer has been found in a large number of instances the most profitable to use.

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* Farmers intending to use this fertilizer are invited to correspond with this Division, stating the nature of their soil and its history as regards recent manuring and cropping. Advice will then be given as to mixtures that will probably prove useful.

For Cereals, Grass:

Dog-fish scrap	300 lbs.
Nitrate of soda	100 "
Superphosphate	300 "
Muriate of potash	50 "

Application—300 to 800 lbs. per acre.

For Potatoes, Roots generally, and Clover:

Dog-fish scrap	300 lbs.
Nitrate of soda	50 "
Superphosphate	400 "
Muriate of potash	150 "

Application—300 to 800 lbs. per acre.

Dry sand or fine loam may be added to the mixed fertilizer to facilitate distribution.

Probably the best plan of application is to broadcast the fertilizer on the thoroughly prepared land in the spring, previous to seeding, incorporating with the soil by one or more harrowings. It has been found that fish refuse gives the best returns on moderately light, warm, moist soils.

What is the value of the nitrogen and phosphoric acid in this scrap? This question has been frequently submitted to us during the past few months, and it seems desirable that an answer should be given here in conjunction with the foregoing information respecting the nature of this new fertilizing material.

In the last bulletin on 'Commercial Fertilizers as Sold in Canada,' issued by the Inland Revenue Department, the following valuation is given:—

Organic nitrogen in ground bone, fish, blood or tankage	16c. per lb.
Phosphoric acid, according to solubility, from	1½ to 6c. "

Until data obtained from actual trials in the field are available, we perhaps should not be justified in affirming that this fish scrap should be placed in the same category with the above-mentioned fertilizers; we might suppose, however, that both its nitrogen and phosphoric acid, in the absence of deterrent influences, will be found equally available with those of these fertilizers. The question therefore is, are there any factors of an unfavourable character in connection with this material? First, as regards the degree of fineness. As pointed out, this is an important matter and several of the samples give evidence that there is room for improvement in this respect. The finer the material the more readily will the fertilizing elements be set free in the soil. If the material contains much coarse bone, that is, pieces 1 inch to 1½ inches in length, it cannot be considered as being in the best condition for direct application to the soil.

Secondly, as fully explained in the text of this report, the presence of a large quantity of oil is most undesirable, especially where large applications are made year after year. In the greater number of the dog-fish refuse samples examined, the percentage of oil was undoubtedly too high. Very probably this will be materially decreased as methods of manufacture are improved—a matter which is now receiving attention at the reduction works.

After a very careful consideration of all these matters, the writer is inclined to the opinion that the nitrogen in the pure dog-fish scrap, as represented by samples examined, is not quite equal in value, agriculturally, to that in the better class of organic fertilizers, and for this reason its price should be somewhat less. Provisionally, we should place this reduction at two to three cents per lb., that is, a value of about 13c. per lb. The phosphoric acid should be worth in the neighbourhood of 5c. per pound.

This dog-fish refuse should prove a very valuable source of nitrogen for the farmer in the Maritime Provinces, and especially so when freed to a greater degree of its oil. When unmixed with other fish offal, it is not rich in phosphoric acid and naturally it does not contain any potash. But these elements can be supplied by the admixture of various materials (superphosphate, muriate of potash, &c.), as indicated by the formulae given on the preceding page and thus a complete and effective fertilizer prepared.

TOBACCO REFUSE.

In 1903 we reported on certain samples of tobacco stems and tobacco dust, showing that these waste products had a high fertilizing value by reason of the nitrogen and phosphoric acid they contain. Two samples forwarded by Wm. Ewing & Co., Montreal, have received our attention during the past year. The results are as follows:—

—	Tobacco Stems.	Tobacco Dust.
Moisture	10·22	7·89
Organic matter	67·04	62·11
Ash or mineral matter soluble in acid	21·42	16·97
Ash or mineral matter insoluble in acid	·42	13·03
	100·00	100·00
Nitrogen	2·22	2·95
Phosphoric acid	·53	·49
Potash	7·52	2·73

Both materials evidently possess fertilizing qualities of considerable value. In nitrogen and phosphoric acid the differences are not large, but it will be noticed that in potash the 'stems' are much richer than the 'dust.' Calculated to pounds per ton we obtain the following figures:—

	Tobacco stems. Per ton.	Tobacco dust. Per ton.
Nitrogen	44·4 lbs.	59·0 lbs.
Phosphoric acid	10·6 "	9·8 "
Potash	150·4 "	54·6 "

Tobacco waste is frequently used for insecticidal purposes, either dry, in the form of a decoction, or for fumigation, and the value of any particular sample for such use will depend almost entirely on the proportions of nicotine it contains. The samples under discussion yielded data as follows:—

Tobacco stems	·67	per cent nicotine.
Tobacco dust	1·03	" "

TOBACCO ASHES.

This fertilizer was forwarded for analysis and report from the McDonald College, Ste. Anne de Bellevue, Que. It was stated to be ashes from a furnace in which tobacco waste was burnt. Its comparative purity and very high value for furnishing potash are obvious from the analytical data:

Potash	30·69 per cent.
Phosphoric acid	4·59 "

Valuing the potash at 5c. per lb. and the phosphoric acid at, say, 4c. per lb., we obtain a value per ton of $35.28.

WOOD ASHES.

When this fertilizer is sold at rates of $10 or higher per ton, it naturally falls under the official inspection made anually by the Inland Revenue Department. If, however, it is sold for less than $10 per ton it is exempt under the Fertilizer Act from analysis by that department, and there is nothing to prevent the sale of partially leached or otherwise adulterated ashes. That fraud in this matter is practiced will be evident from the following analysis, which was made on a sample forwarded from Wolfville, N.S. These ashes, it was stated, had been imported by the carload from Ontario and were being largely bought by fruit growers in the Annapolis valley:—

	Per cent.
Moisture	28·17
Insoluble residue	7·83
Phosphoric acid	1·41
Potash	4·28

These ashes are decidedly below the average in potash and show an altogether too high moisture content. Good, unleached wood ashes do not as a rule fall below 5·5 per cent potash, and their percentage of moisture would be in the neighbourhood of 10 per cent.

This examination cannot perhaps be considered as legitimately coming within the scope of our work; the analysis, however, was made with the object of warning farmers and orchardists against the risk of purchasing such materials without a guarantee from the vendor.

LIME KILN ASHES.

A sample sent from Lennox Ferry, N.S., and said to be purchasable there at $4.25 per ton, was submitted to analysis, with the following results:—

	Per cent.
Potash	4·77
Phosphoric acid	1·93
Carbonate of lime	57·16

For lime kiln ashes this sample shows an unusually high percentage of potash, though in respect to this important constituent it is not the equal of good wood ashes. It should prove an excellent fertilizer for soils in need of potash and lime and if the sample is thoroughly representative the price asked is quite reasonable.

A further sample forwarded by a correspondent from near Montreal gave results indicating a value far below that of the preceding:—

	Per cent.
Potash	1·25
Phosphoric acid	·43
Carbonate of lime	62·09

Such ashes, valuing the fertilizing constituents at market prices, would be worth about $2 per ton.

ASHES FROM MUCK.

It frequently happens in the clearing of muck lands by fire that the muck to a considerable depth is burnt, leaving a more or less heavy coating of ashes. This occurs more especially when the clearing is done during a dry season and may result in the loss of a large area of valuable soil. If the deposit of muck is of considerable depth the ashes formed by the burning of the surface 2 or 3 inches will be beneficial, and this method may be employed to advantage, but care should be taken that the fire does not burn too deeply, or more harm than good will result.

A correspondent at Pont Rouge, Que., having a large quantity of such muck ashes, forwarded a sample with the inquiry as to their fertilizing value for other parts of his farm. These ashes were submitted to analysis with the following results:—

	Per cent.
Potash	·60
Phosphoric acid	1·68
Lime	21·75

Although these ashes are not as rich as wood ashes, they certainly possess a very considerable fertilizing value, especially for soils containing an abundance of vegetable organic matter. For all soils in need of lime and mineral fertilizers an application of these ashes conjointly with farmyard manure would be advantageous, as also for root crops, clover and fruit trees.

SPENT BONE CHAR.

This material, from the Edwardsburg Starch Co., Cardinal, Ont., is bone char after use in sugar purification and contains a high percentage of phosphoric acid. It is not, however, used now-a-days directly as a fertilizer, for the reason that its phosphoric acid is not readily converted into soluble forms in the soil, but it is largely employed in the manufacture of superphosphate.

Analysis.

	Per cent.
Phosphoric acid (equivalent to 68·2 bone phosphate)	31·25
Nitrogen	1·25

These data indicate a quality somewhat above the average; the superphosphate resulting from its treatment would possess a notable amount of nitrogen.

FODDERS AND FEEDING STUFFS.

COMMERCIAL FEEDING STUFFS.

Every year a number of samples of commercial feeding stuffs are submitted to us for analysis and report as to their nutritive value. These are for the most part representative of the by-products from breakfast food factories, starch factories, beet-sugar factories, elevators, &c., &c.—of which there are many now upon the market. They necessarily vary in feeding qualities according to their source. Some are excellent, being rich in protein and fat, while others are comparatively worthless, being characterized by a low protein content and high fibre. Unfortunately many of the latter, in which oat hulls are frequently a predominating constituent, are finely ground and thus the farmer is unable from inspection to judge of their value. For such analysis and microscopic examination are the only means of ascertaining their nature and worth.

Until such time as there is a systematic, annual examination of all such materials —the desirability of which the writer has repeatedly emphasized—it has been thought well to continue this work, and thus furnish information that will afford the farmer the means to exercise his judgment in purchasing feeding stuffs and to protect himself against worthless brands. The feeds thus analysed do not represent all such materials upon the Canadian market; the time at our disposal has only permitted the examination of those regarding which inquiries have been received and which have not in recent years been analysed by us.

ANALYSIS of Feeds, 1906.

No.	Name of Feed.	Particulars.	Moisture.	Protein.	Fat or Oil.	Carbro-hydrates.	Fibre.	Ash.
1	Oat Middlings	Flavelle Milling Co., Lindsay, Ont.	6·30	11·12	5·71	52·88	18·85	5·14
2	Oat Dust	London Oatmeal Mills, Ont.	5·06	9·93	4·40	50·79	23·81	6·01
3	Oat Feed	" " " "	4·71	11·75	5·02	59·63	15·18	3·71
4	Feed Oatmeal	Tilsonburg Mills, Tilsonburg, Ont.	.....	16·69	8·52	....	2·31	.....
5	Oat Feed	Ogilvie Milling Co., Montreal	4·12	6·56	3·17	54·69	25·72	5·74
6	Corn Bran	Distillery, Wiser & Son, Prescott, Ont	....	6·81	3·83	.....	15·95	.....
7	Gluten Feed	Brantford Starch Works, Brantford, Ont	6.30	10·56	9·04	68·41	5·04	·65
8	"	" " " "	......	12·56	8·85	......	......	......
9	Glucose Feed	Edwardsburg Starch Co., Cardinal, Ont	56·25	11·10	11·95	19·44	.....	1·26
10	Rice Meal	Brackman Ker, Victoria, B.C	.....	14·37	16·93	......	...	9·02
11	Cotton Seed Meal	J. B. Schaffner, Halifax, Importer.	.....	34·56	8·87	......	......	......
12	Malt Sprouts	La Cie de Brasserie de Beauport, Que	6·37	27·43	1·69	47·47	11·12	5·92
13	Molac Molasses Dairy Feed	American Cereal Co., Peterboro, Ont	....	14·62	3·18	......	13·32	5·87
14	Beet Root Feed	Wallaceburg Sugar Co., Wallaceburg, Ont.	4·89	9·47	1·39	78·15	2·59	3·51
15	Screenings, Crushed	Elevator, Imported into Quebec from Northwest	.....	12·56	5·60	.....	11·36	.....
16	Buckwheat and Oat Feed	McAllister Milling Co., Peterboro, Ont.	6·67	11·00	2·30	58·18	16·76	3·99
17	Buckwheat, Corn and Oats	" " " "	6·06	11·00	2·82	64·76	12·36	3·00
18	Mixed Chop	" " " "	5·16	5·34	1·42	59·58	24·58	3·92
19	Ground Middlings	" " " "	6·62	11·31	3·64	69·19	7·00	2·24
20	Wild Buckwheat	J. G. King & Co., Port Arthur, Ont.	7·48	10.16	2·89	70·00	7·29	2·18
21	Small Seeds cleaned from Flax	" " " "	4·41	18·78	24·48	33·27	9·51	9·55
22	Small Seeds cleaned from Wheat	" " " "	7·62	15·50	9·64	54·86	17·21	5·17
23	Seeds, Broken Wheat, Small Oats, &c., ready for grinding	" " " "	8·54	14·12	7·75	56·40	8·36	4·83
24	Ground Seeds obtained by grinding No. 23	" " " "	9·14	17·31	9·74	51·76	6·58	5.49
25	Ground Feed Mixture, 25 p.c. No. 23 and 75 p.c. Barley	" " " "	9·75	13·19	5·27	60·54	7·60	3·68
26	Ground Feed Mixture, 25 p.c. No. 23 and 75 p.c. Barley	" " " "	9·19	13·00	5·38	62·19	6·34	3·90
27	Ground Feed Mixture, 50 p.c. No. 23 and 50 p.c. Barley	" " " "	9·90	12·94	5·14	60·63	7·49	3·90
28	Flax Chaff	" " " "	7·68	6·06	4·15	62·55	13·88	5·68
29	Buckwheat Chaff	" " " "	10·00	7·87	2·55	63·72	13·22	2·64
30	Fine Broken Stock	" " " "	10·43	11·68	3·62	55·64	14·28	4·35
31	Wheat Chaff	" " " "	6·25	5·31	2·49	45·80	27·50	12·65

OAT PRODUCTS.

No. 1. Oat Middlings.—Manufactured by the Flavelle Milling Co., Lindsay, Ont., and retailed at Shediac, N.B., from where the sample was forwarded, at $20 per ton. This feed contains about three-fourths the protein and twice the fibre of bran. Though the analysis shows it to be decidedly inferior to bran, it is by no means a poor or worthless feed. It contains fair percentages of protein and fat and might be used to advantage if the price asked is not too high, compared with others on the same market.

No. 2. Oat Dust; No. 3. Oat Feed.—Manufactured by the London Oatmeal Mills. No. 2 retailed at $7; No. 3 at $10 per ton. Oat dust is an exceedingly poor feed, consisting largely of the hulls, hairs, dust from cleaning the grain, &c. The present analysis gives results very similar to those previously obtained on the same product from other mills, and I judge therefrom that the profitable use of such feeds is a matter open to much question. Of course, what may be a high price in one part of Canada may be a low one in another part; freight rates, the quantities bought, &c., must all be considered. The only way for the farmer to intelligently arrive at a decision is to compare prices, having a knowledge of the nutritive value of the feeds and of his special requirements. If there is an abundant supply on the farm of low-protein, coarse fodders, there could be no economy, no object, in purchasing oat dust at any price. The Oat Feed (No. 3) is a decidedly more valuable product. Though containing a large proportion of hull, it also possesses a fair amount of fine meal and broken grain. In composition it is seen to be very similar to No. 1.

No. 4. Feed Oatmeal.—Manufactured by the Tilsonburg Mills, Ont. Stated to cost in car lots in New Brunswick about $37 per ton. Advocated for poultry use and stated to be practically free from hull and foreign matter. The percentages of protein and fat are such as to give the product a high feeding value; the low fibre content is also in its favour, especially for poultry feeding. The large percentage of fat would, however, call for its limited use in the case of laying stock.

No. 5. Oat Feed.—Manufactured by the Ogilvie Milling Co. Consists largely of oat hulls and contains very little fine meal. An extremely poor feed, being very low in protein and exceedingly high in fibre.

CORN PRODUCTS.

No. 6. Corn Bran.—From the distillery of Wiser & Son, Prescott, Ont. It consists entirely of the husk or skin of the corn grain and is of very low feeding value. Among those analysed during the past year, it stands lowest in protein. Though a 'clean' feed—that is free from foreign matter—its nutritive qualities are such that it must be bought cheaply if it is to be used profitably. This would preclude freighting for any distance. Our correspondent quotes it at $13 per ton—a price much above its real worth.*

No. 7 & 8. Gluten Feed.—Manufactured by the Brantford Starch Works, Brantford, Ont. Attention must be drawn to the composition of this product, for the reason that there are 'gluten feeds' upon the market containing practically twice the amount of protein possessed by this brand. Good quality gluten feed, it has been shown, will contain in the neighbourhood of 22 per cent protein. It is much to be regretted that feeds of such great differences in value should be offered for sale under the same name—and especially in such a case as this, where the name implies similar origin.

No. 9. Glucose Feed.—Edwardsburg Starch Co. A pasty substance of which there is a small quantity formed in the manufacture of glucose. It is sold in barrels, locally, and has been used both in pig and cattle feeding. In spite of its high water-content, the analysis gives it a very fair feeding value—being especially rich in oil. It is doubtful, however, if it could be extensively used as it is to a certain degree unpalatable. A correspondent writes that he has fed it, 'after mixing into a very thin slop with other feeds, to pigs, and got good results, but animals don't take to it at first and won't take much of it anytime.'

RICE MEAL.

No. 10. Rice Meal.—From the Brackman-Kerr Milling Co. This feeding stuff, used more particularly for milch cows in British Columbia, is somewhat variable in composition. The present sample is of excellent quality. Certain 'rice feeds' have come under our notice that contained ground rice hulls, and consequently of much lower value.

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* A distinction must be made between corn bran from the distillery and corn bran from the starch works. We have invariably found the latter the better feed, containing between 9 and 10 per cent protein.

COTTON SEED MEAL.

No. 11. Cotton Seed Meal.—This sample was forwarded by Mr. R. Chisholm, Antigonish, N.S., and stated to be imported by Messrs. Schaffner of Halifax. There are many qualities of this highly concentrated feed stuff upon the Canadian market. Genuine cotton seed meal of the first grade will contain about 42 per cent protein and 13 per cent fat; inferior brands examined in the Farm Laboratory have analysed as low as 23 per cent protein and 5 per cent oil. Purchasers of cotton seed meal should ask for the percentages of protein and fat guaranteed to be present. This ought to be obtainable, as the wholesale importers buy, or may do so if they wish, on such a basis. Though it is impossible to say from inspection what the proportion of the chief nutritive constituents may be, a judgment may be formed from the appearance of the meal; inferior brands are dark in colour and show coarse fragments of hulls, whereas high grade meals are bright yellow and free from hull. It is more particularly in the Maritime Provinces where cotton seed meal is used, it coming direct by ocean freight to Halifax or St. John from shipping ports in the Southern States.

MALT SPROUTS.

No. 12. Malt Sprouts.—From La Cie de Brasserie de Beauport, Que. As the name indicates, this feed is composed of the sprouts from barley germinated in the preparation of malt. After drying the germinated grain, the sprouts are readily detached and separated by sieving. It is a highly concentrated feed stuff as regards protein, containing from 23 per cent to 27 per cent, but is very poor in fat. A very large proportion of its protein is digestible—a fact which enhances its value for bringing up the proportion of the nitrogenous nutriments in the ration of milch cows. It does not appear to be a very palatable feed, and consequently can only be fed in comparatively small quantities—say about 2 lbs. per day. Malt sprouts have a high absorptive capacity and should be soaked several hours before feeding.

BEET ROOT PRODUCTS.

No. 13. Molac Molasses Dairy Feed.—Manufactured by the American Cereal Co., Peterboro, who in their advertising circular state that this feed 'is a perfect blending of grain products—the high protein portions of oats, corn and wheat scientifically treated, with the correct proportion of best cane molasses.' At the time of our analysis, it was quoted at $22.90 per ton at Montreal. In addition to 14 per cent of protein it was found to contain in the neighbourhood of 13 per cent sugar; it should, therefore, prove both a nourishing and palatable feeding stuff. It differs chiefly from the 'Improved Molasses Cattle Food,' analysed and reported on in 1903, in containing a much higher percentage of protein.

No. 14. Beet Root Feed.—Wallaceburg Sugar Co. This is the dried, exhausted, beet pulp. Though in all probability, a readily digested and palatable food, its composition, as indicated by the analytical data, clearly shows it to be distinctly inferior in nutritive qualities to bran or shorts. It would be of little value where a feed is desired to bring up the protein content of the ration, as for instance in the supplementing of the home grown coarse fodders.

MISCELLANEOUS ELEVATOR AND MILLING PRODUCTS.

No. 15. Screenings.—Regarding this feeding stuff, a correspondent in Warden, Quebec, writes: 'Please advise as to comparative feeding value of this food, a car load of which has been received from an elevator at Fort William. It was sold at $13 per ton. Are there any dangerous weed seeds in it and will grinding, as per sample, prevent their germination?'

On examination, it was found to contain small and broken wheat, barley, oats, flax, weed seeds, broken straw and hulls. The sample was submitted to Dr. Fletcher, the Botanist, who determined the nature of the weed seeds, as follows: Wild Buckwheat, Lamb's Quarters, Wild Sunflower, Bearded Wheat-grass, Wild Oats, Blue-bat, Wild Mustard, Sun Spurge, False Flax, Hare's-ear Mustard, Stinkweed, Great Rag-Weed, Dragonhead, Canada Thistle, Green Foxtail, Barnyard grass, Wild Rose. The weeds are named in order as to quantity, approximately, in sample.

A considerable quantity of the ground or crushed sample was sown in the test boxes, to ascertain the number of vital seeds present; only two plants appeared.

From the chemical data, it is evident that this feed has a fair nutritive value; compared with bran it contains about 2 per cent less protein, a slightly higher percentage of fat and about one-third more fibre. The experience of several farmers with whom I have corresponded on the subject, is that ground screenings are more or less unpalatable, that some animals refuse them and that in any case they can only be used as a portion of the meal ration. This if confirmed is a serious objection. The distastefulness is caused chiefly, we presume, by the presence of sulphur oils, found in many seeds of the cruciferae (mustards) and which no doubt would impart an unpleasant pungency to the feed.

Nos. 16, 17, 18 and 19.—These constitute a series of by-products from the McAllister Milling Co., Peterboro. No. 16 consists chiefly of the hulls of oats and buckwheat, with very little fine meal. No. 17 is largely composed of the hulls of oats and buckwheat, but with more fine meal than No. 16. There is a certain proportion of corn present. No. 18, apparently, consists entirely of fine oat hulls and corn bran, with practically no fine meal. No. 19 is largely corn meal and corn bran, with very little, if any, oat hulls present.

Feeds Nos. 16 and 17 are equal as regards protein; the lower percentage of fibre in No. 17, however, makes this sample the better of the two. They must both be considered low grade feeding stuffs.

No. 18 is an extremely poor feed, being very low in protein and exceedingly high in fibre. In feeding value it would rank with straws and other coarse fodders of that class.

No. 19. The best of the series; a fairly good but not a high grade feed, considered from the standpoint of protein content.

Nos. 20 to 31, inclusive, were received direct from Joseph G. King & Co., Lessees of the C.P.R. Elevator at Port Arthur, the analyses being undertaken to learn the nutritive value of the various weed seeds, &c., as obtained from the cleaning of wheat flax and other cereals at the elevator. A very large amount of such refuse or screenings must be obtained annually, the greater proportion of which apparently is at present wasted. If finely ground there could be no danger of disseminating noxious weeds, and there seems no reason, save perhaps on the ground of unpalatableness, why certain classes of such refuse could not be used to advantage, especially if mixed with a fair proportion of ground barley or other grain. As remarked when discussing No. 15, cattle and pigs do not eat such feed with relish—indeed at first they may entirely refuse it, possibly owing to a certain pungency. This flavour, however, would depend upon the proportion of certain weed seeds and might in a large measure be overcome by mixing with various meals.

No. 20. Wild Buckwheat.—This sample contained no foreign matter or admixture; the analysis, therefore, represents the composition of the seed of wild buckwheat. While not a highly nitrogenous or oily seed it is of fair feeding value, being quite low in fibre.

No. 21. Small seeds cleaned from Flax.—The bulk of this sample consists of broken flax seeds which form probably 98 per cent of the whole. The other 2 per cent is made up of seeds of Lamb's-quarters, Wild Mustard, False Flax and Hare's-ear Mustard, the abundance being in the order of the names given. It is a feed very rich in protein and exceedingly high in fat or oil and accordingly must be considered a valuable feeding stuff.

No. 22. Small Seeds cleaned from Wheat.—Consists probably to the extent of 95 per cent of the whole of the seeds of Lamb's-quarters; the other 5 per cent, of Hare's ear Mustard, Stink-weed, False Flax and Sticky Cockle. In spite of the high fibre, due to the presence of broken straw and chaff, this feed possesses a proportion of protein equal to that in the best qualities of bran; the percentage of fat is also very satisfactory.

No 23. Seeds, Broken Wheat, Small Oats, &c., mixed for grinding.—Dr. Fletcher reports regarding this sample as follows: Broken wheat and wild buckwheat constitute 95 per cent of the whole; the other 5 per cent consists of Wild Oats, Ball Mustard, Lamb's-quarters, Wild Mustard and Cow Cockle. The analysis shows the mixture to be a little lower in protein and fat than No. 22, but still a fairly good feed. Provided it is not distasteful it should prove very satisfactory, though, of course, not equal to those feeds containing from 20 per cent to 30 per cent protein, as gluten meal, oil cake and other seed meal.

No. 24.—This sample purported to be obtained by grinding No. 23; the analytical data, however, makes it very clear that the proportion of seeds rich in protein and fat must have been considerably greater in No. 24. From the feeding standpoint No. 24 should be much more valuable than No. 23.

It is quite probable that uniformity in composition, and hence in feeding value, may be in a measure difficult to obtain in a meal so produced, for there is a large variety of weed seeds entering into the make-up of the screenings, and these seeds differ widely in their percentages of protein and fat. Since all these weeds are not equally distributed, *i.e.*, equally prevalent in all wheat districts, it follows that the screenings from any consignment of wheat will vary more or less from the screenings obtained by cleaning other consignments, and this variation may have, as we have seen, a marked influence on the food value of the product. If such refuse materials therefore, are to be used in the preparation of foods it seems highly desirable that the output should be controlled by analysis.

Nos. 25 and 26. 'Ground Feed' No. 25, was made by the manufacturer by mixing 25 parts of No. 23 (ground) with 75 parts of ground barley, the chief object in adding the barley being to lighten the colour and thus make it more marketable. No. 26 consists of No. 23 and barley, in the same proportion as in No. 25, but ground together. As would be expected, the data of these two samples are in close accord. They indicate a feed that should prove practically equivalent to shorts.

No. 27 is stated to be made by grinding equal weights of No. 23 and barley. The differences between this and the two preceding samples (containing a larger proportion of barley) in the percentages of protein and fat are very slight, and I conclude that the feeding value is practically the same for all three samples, Nos. 25, 26 and 27.

No. 28. 'Flax Chaff,' obtained in the cleaning of flax, being light and separated by wind, consists chiefly of the broken seed pods of the flax. A very poor feed as regards protein, and though the flax seeds that are present furnish a fair percentage of fat, the material must be considered as distinctly low-grade.

No. 29. 'Buckwheat Chaff.'—Very largely composed of the hulls of wild buckwheat. This is also a material of extremely low feeding value.

No. 30. 'Fine Broken Stock.'—Broken wheat, buckwheat, and seeds, hulls, hairs, &c., containing a certain amount of fine meal. It is too high in fibre to be classed with the more valuable feeding stuffs, but its percentage of protein (11.68) makes it decidedly superior to oat dust and feeds of that character.

No. 31. 'Wheat Chaff.'—From inspection one would judge this to be fairly free from foreign matter. The data, however, indicate a slightly superior value to pure wheat chaff, no doubt due to the presence of a small quantity of broken wheat. It is scarcely necessary perhaps to point out that the straws and chaffs constitute a class of feeds of extremely low nutritive value.

From a study of the analytical data of these elevator refuse, it will be evident that while some of these materials possess high nutritive qualities others are comparatively worthless for furnishing those nutrients for which meals and concentrated feed stuffs are more particularly bought. Since in the finely ground state it is almost impossible to form a correct estimate as to their worth, the necessity of purchasing on analysis will be obvious. Two other points must also be kept in mind, if large purchases are being considered: fineness of the meal to prevent dissemination of weed seeds, and palatableness to the stock it is intended for. The farmer should satisfy himself regarding these matters before making large purchases.

APPLE POMACE.

This was forwarded by a correspondent in Aylmer, Ont., last January, who writes: 'This pomace was made at our cider mill last autumn and is taken from a large pile that is still left. For the past month or so we have been feeding it to 4 dairy cows and they are keeping right up in their milk flow. We commenced with a pail full of pomace and now feed half a bushel to each cow twice a day. They also have 3 quarts of oat and wheat chop (5 parts oats to 1 part wheat) twice a day, corn stalks twice with hay at noon. How do you think the pomace compares with roots?' In a letter some three weeks later the same correspondent says 'Occasionally we would omit a feed of pomace and we noticed that at the next milking there would be a falling off of about 1½ lbs.—we weigh the milk at every milking. The pomace is fed directly after milking, otherwise it would taint the milk.'

Analysis.

	Per cent.
Water	80·30
Protein	1·17
Fat	·67
Carbohydrates	16·77
Fibre	·48
Ash	·61
	100·00

The dry matter of pomace is not so valuable as that of mangels, since it is destitute of sugar. Mangels contain usually in the neighbourhood of 10 per cent dry matter; but varieties differ in this respect, the 'sugar' mangels being much richer, many of them containing 13 per cent, one-half of which may be sugar. Since this pomace contains practically half as much more dry matter (19·70 per cent), it will probably be found, that used judiciously, it has a feeding value approximately equal to this class of roots. The percentage of dry matter in the pomace is approximately equal to that in corn ensilage, but its protein content is slightly less.

There seems to be an impression among many farmers that apple pomace tends to dry off the cows, but data to confirm this seem to be wanting.

MEAT MEALS FOR POULTRY.

Several analyses of these concentrated foods were given in the report of this division for 1904, to which the reader is referred for information regarding the general character and use of these substances. Last year two brands were examined for the Poultry Division and the data are here given in the expectation that they may be interesting to poultry feeders.

——	Moisture.	Protein.	Fat.	Total Ash.	Ash Insoluble in Acid, (Sand,&c.)
No. 1.—Cypher's Beef Scrap	7·97	66·56	14·66	4·92*	·37
No. 2.—Morgan's Meat Meal	4·92	36·44	14·47	35·15	

* Containing 3·62 p.c. bone.

No. 1.—An excellent meal, well calculated for use to increase the protein ratio in poultry food. It differs from the majority of the better samples examined in 1904 by possessing a larger proportion of protein, but a small percentage of bone.

No. 2.—For furnishing protein, this meal is worth but little more than half No. 1. A comparison with the results obtained on the Morgan product in 1904 shows that its composition is practically identical with the meal then manufactured.

THE NUTRITIVE VALUE OF FROZEN WHEAT STRAW AND CHAFF.

It occasionally has happened in certain districts of the northwestern provinces that frost has overtaken the wheat crop while the grain is still immature, or in other words not fully ripe. Under such circumstances, development of the grain is arrested and a small, more or less shrivelled, kernel results. This frosted wheat, as we showed some years ago, is very valuable from the feeding standpoint, though injured for flour making purposes. Our data proved that its protein content is considerably higher than that of the unfrozen, fully ripened wheat.

We are now able to present data respecting the straw and chaff of frozen wheat, the desirability of the work being brought before us by a correspondent in the northwest who considered that such straw and chaff might possess an enhanced feeding value. Our correspondent writes: 'Some wheat was injured by frost a week or ten days before it was ripe, or about September 2, (1905). Thinking the straw worthless, we put it at the bottom of the stack. However, the cattle discovered it and ate it in preference to the upper part of the stack, which was left standing until there was danger of it falling over. Can you give me any reason for this preference? Evidently the frozen straw has a higher feeding value.'

Accordingly, we obtained samples of frozen straw and chaff and also, for the purposes of comparison, straw and chaff from similar wheat that had been fully matured. As these were from adjacent fields the conditions of growth were probably very much alike until such time as the frost occurred. As the samples were from the thresher and contained as a consequence broken grain and more or less foreign matter, they were all carefully picked over before grinding for analysis. The data, therefore, represent in each case the composition of straw and the chaff perfectly free from any admixture or impurity.

ANALYSIS.

—	Water.	Protein.	Fat.	Carbohydrates.	Fibre.	Ash.
Straw.						
Frozen	5·74	4·41	1·42	44·07	38·36	6·00
Not frozen	6·55	3·78	1·46	43·40	38·33	6·48
Chaff.						
Frozen	4·55	3·94	·83	42·88	33·50	14·30
Not frozen	4·05	3·59	·78	44·01	32 13	15·44

These data, while showing that no very great differences exist, are sufficiently clear to confirm the conjecture that the frozen straw and chaff have the higher nutritive value.

The frozen straw contains ·63 per cent or about one-seventh more protein than the straw from the unfrozen, fully ripened grain; and, similarly, we find in the frozen chaff a higher protein content (about ·39 per cent) than in that from the fully matured wheat.

Since the cattle prefer the frozen straw there can be no doubt about its greater palatability. This is partly due to its being less hard and possibly in part to the development of a certain amount of sugar by the frost—a point unfortunately overlooked at the time of analysis, but upon which it is intended to obtain data on some future occasion. It may further be supposed that the digestibility of the immature straw will be somewhat higher than that from the fully ripened grain.

Certain agricultural authorities have stated that wheat-chaff contains a higher percentage of crude protein than wheat straw. Our data do not confirm this statement. The principal points of difference between the chaff and the straw as brought out by the present analyses are that the chaff contains less fat and less fibre, but considerably more ash than the straw. The higher percentage of ash in both samples of chaff is worthy of note, especially in view of the fact that they were carefully freed from foreign matter.

As to the comparative feeding value of the straw and chaff from the same crop, the writer is of the opinion that while the former is slightly richer in protein and fat, the latter by reason of its lower fibre and the fact that it is more readily eaten by stock is, practically, the more valuable fodder.

THE RELATIVE VALUE OF ROOTS.

The past season marks the seventh of this investigation. The value of the work will be obvious on consultation of the data, which show that very large differences in dry matter and sugar may exist between varieties in the same class of roots, grown under the same climatic and cultural conditions. It, therefore, behooves the farmer when considering the yields per acre with a view to selection of the variety for sowing, that he should also consult the analytical data in this and past reports of the Chemical Division. The larger the percentages of dry matter and sugar the higher the feeding value of the root.

Incidentally also the results are of interest in furnishing information respecting the effect of seasonal conditions on the composition of the root, though in this matter the figures must not be too closely interpreted. It is impossible to say that the strain or parentage of seed sold under the same name remains the same for a number of years—and the breed factor has considerable determinative value, as will be noted further on in the present report.

Mangels.—In the subjoined table we present the results from the analysis of 16 varieties of mangels. The varieties are named in the order of their dry matter. Between the first and the last there is a difference of 5·53 per cent dry matter (practically 40 per cent of the total dry matter), and of 4·67 per cent sugar (practically 67 per cent of the total sugar). These are significant figures when we remember that all the varieties were grown on practically the same soil and that necessarily the conditions of rainfall, temperature, &c., were the same for all.

Analysis of Mangels, C.E.F., Ottawa, Ont., 1906.

Variety.	Water.	Dry Matter.	Sugar in Juice.	Average Weight of One Root.	
	p.c.	p.c.	p.c.	Lbs.	ozs.
Half Long Sugar Rosy	86·48	13·52	6·89	1	14
Yellow Intermediate	86·84	13·16	7·53	2	10
Gate Post	87·10	12·90	6·59	2	2
Giant Yellow Globe	87·27	12·73	6·45	1	8
Selected Mammoth Long Red	87·34	12·66	5·20	2	4
Prize Mammoth Long Red	87·48	12·52	7·35	3	1
Giant Sugar	87·59	12·41	7·52	2	11
Selected Yellow Globe	88·15	11·85	5·50	1	14
Half Long Sugar White	88·24	11·76	6·28	2	10
Mammoth Yellow Intermediate	88·56	11·44	6·10	2	4
Mammoth Long Red	89·03	10·97	6·57	3	3
Giant Yellow Intermediate	89·11	10·89	5·53	2	13
Triumph Yellow Globe	89·21	10·79	4·53	2	1
Leviathan Long Red	89·26	10·74	4·93	2	13
Prize Winner Yellow Globe	90·22	9·78	5·71	2	4
Lion Yellow Intermediate	92·01	7·99	2·22	2	2

Compared with the results of the previous year (1905), they are on the whole, considerably better, undoubtedly due to the more favourable climatic conditions that prevailed in the autumn months of 1906.

The data for the past three years are subjoined.

Year.	Varieties analysed.	Dry matter. Per cent.	Sugar. Per cent.
1904	10	11·69	6·62
1905	17	10·04	4·67
1906	16	11·63	5·93

Turnips.—Twenty varieties of turnips have been analysed. Their dry matter ranges from 10·99 per cent to 13·61 per cent, and their sugar content from ·96 per cent to 6·23 per cent. As a class, there are not the differences observable in mangels, and especially is this true as regards dry matter. The variety (Bangholm selected) giving 6·23 per cent sugar is exceptional, the highest among the remaining 19 varieties being only 2·74 per cent.

ANALYSIS of Turnips, C.E.F., Ottawa, Ont., 1906.

Variety.	Water.	Dry Matter.	Sugar in Juice.	Average Weight of One Root.	
	p.c.	p.c.	p.c.	Lbs.	Ozs.
Magnum Bonum	86·39	13·61	1·50	1	6
Drummond Purple Top	86·79	13·21	2·74	1	10
East Lothian	87·15	12·85	1·83	2	0
Jumbo	87·23	12·77	1·43	1	9
Bangholm Selected	87·32	12·68	6·23	1	9
Halewood's Bronze Top	87·36	12·64	1·32	1	11
Kangaroo	87·39	12·61	1·32	1	8
Selected Purple Top	87·36	12·64	1·10	1	3
New Century	87·74	12·26	1·26	1	8
Hartley's Bronze	87·84	12·16	1·52	1	9
Mammoth Clyde	87·87	12·13	1·33	1	7
Emperor Swede	88·16	11·84	0·96	1	15
Skirvings	88·21	11·79	1·21	1	12
Hall's Westbury	88·24	11·76	1·61	1	13
Elephant's Master	88·29	11·71	1·33	2	1
Imperial Swede	88·42	11·58	1·11	1	8
Perfection Swede	88·29	11·71	1·20	1	8
Carter's Elephant	88·48	11·52	3·85	1	11
Sutton's Champion	88·85	11·15	1·53	1	8
Good Luck	89·01	10·99	1·32	1	12

The average results for the past two years are as follows:—

Year.	Varieties analysed.	Dry matter. Per cent.	Sugar. Per cent.
1905	20	10·09	1·10
1906	20	12·18	1·78

It will be seen, therefore, that the past season, as in the case of the mangels, has produced a more nutritious root.

Our results again give evidence that owing to greater uniformity in composition there is not the same necessity for selection in the case of turnips as with mangels—that is, from the nutritive standpoint—and that yield and keeping qualities are the important factors to consider when determining the varieties to grow.

Carrots.—The extremes in dry matter are 12·46 per cent and 9 per cent. In sugar content the variation is much greater, namely, from 1·97 per cent to 6·59 per cent. The percentage of sugar this year is apparently altogether independent of the proportion of dry matter present, a peculiarity not general among roots, but which we have noticed in past seasons to a certain degree in examining carrots.

ANALYSIS of Carrots, C.E.F., Ottawa, Ont., 1906.

Variety.	Water.	Dry Matter.	Sugar in Juice.	Average Weight of One Root.	
	p. c.	p. c.	p. c.	Lbs.	oz.
Carter's Orange Giant	87·54	12·46	2·86	1	3
Ontario Champion	88·48	11·52	3·13	1	2
Long Yellow Stump Rooted	88·76	11·24	2·75	1	3
White Belgian	88·97	11·03	2·27	1	4
Half Long Chantenay	88·99	11·01	3·50	0	15
New White Intermediate	89·79	10·21	1·97	1	5
Giant White Vosges	90·00	10·00	4·37	1	4
Early Gem	90·19	9·81	3·41	1	2
Mammoth White Intermediate	90·39	9·61	2·79	1	1
Improved Short White	91·00	9·00	6·59	1	2

Averages for the past two seasons are as follows:—

Year.	Varieties analysed.	Dry matter.	Sugar.
		Per cent.	Per cent.
1905	11	10·25	2·52
1906	10	10·59	3·36

The improvement over the roots of 1905 is again apparent, though the difference in this instance is observable in the sugar content rather than in the increased proportion of dry matter.

INFLUENCE OF INHERITED QUALITIES.

The influence of inherited qualities as shown in the percentage of dry matter and sugar has been investigated by us for a number of years past by the annual analysis of two varieties—the Gate Post and the Giant Yellow Globe. For six successive seasons the former has been considerably the better variety. Thus, speaking of this matter in my last annual report and reviewing the averages then obtained, I said that: 'The difference between these varieties, as far as can be ascertained by chemical analysis, shows that weight for weight the Gate Post should be worth between one-third and one-fourth more than the Giant Yellow Globe for feeding purposes.' Although as in every previous year of this investigation, the Giant Yellow Globe again falls behind the Gate Post in dry matter and sugar, the differences in 1906 are very slight. The reason for this cannot be stated; the only one that seems to accord with past results is that the seed sown as Giant Yellow Globe is of some other and richer variety—the mistake in naming having occurred before the purchase of the seed by the experimental Farm. This is, of course, merely conjecture, but it is difficult to account for the exceptional high results obtained on any other ground.

DRY Matter and Sugar in Gate Post and Giant Yellow Globe Mangels.

Season of Growth.	GATE POST.		GIANT YELLOW GLOBE.	
	Dry Matter.	Sugar in Juice.	Dry Matter.	Sugar in Juice.
	p. c.	p. c.	p. c.	p. c.
1900	11·14	6·15	8·19	2·64
1901	9·41	4·15	9·10	4·08
1902	13·90	9·39	10·24	5·24
1903	12·93	7·38	10·89	6·17
1904	12·64	7·62	9·24	5·26
1905	12·07	6·83	8·64	3·55
1906	12·90	6·59	12·73	6·45
Average for seven years, 1900–06	12·14	6·87	9·72	4·77

SUGAR BEETS, FOR FACTORY PURPOSES.

Following the course adopted some years ago, we have again analysed the three chief varieties of sugar beets used for sugar extraction, as grown on the several Experimental Farms. The names of the varieties are Vilmorin's Improved, Klein's Wanzleben, and Très Riche (French Very Rich).

SUGAR BEETS Grown on the Dominion Experimental Farms, 1906.

Variety.	Locality.	Percentage of Sugar in Juice.	Percentage of Solids in Juice.	Co-efficient of Purity.	Average Weight of One Root.	
					Lbs.	oz.
Vilmorin's Improved	Nappan, N.S	15·81	22·01	71·8	0	12
"	Ottawa, Ont	15·48	18·23	84·9	1	10
"	Brandon, Man	16·03	17·89	89·6	1	13
"	Indian Head, Sask	14·65	19·83	73·9	1	8
"	Agassiz, B.C	14·48	17·80	81·3	1	4
Klein Wanzleben	Nappan, N.S	15·90	19·87	80·0	0	11
"	Ottawa, Ont	12·25	20·33	60·2	1	5
"	Brandon, Man	15·97	19·17	83·3	2	1
"	Indian Head, Sask	16·87	21·46	78·5	1	10
"	Agassiz, B.C	13·68	17·10	80·0	1	8
Très Riche	Nappan, N.S	19·53	23·89	81·7	0	9
"	Ottawa, Ont	15·39	18·23	84·4	1	11
"	Brandon, Man	14.50	16·69	86·8	1	9
"	Indian Head, Sask	13·20	17·83	74·0	1	12
"	Agassiz, B.C	14·53	18·06	80·4	0	15

Any detailed discussion of these data is scarcely necessary, the season at all the branch farms apparently being favourable to sugar production, though not in all cases being suitable to a satisfactory tonnage.

The highest percentages are from beets grown at Nappan, N.S., and this may be accounted for by the fact that the roots were much smaller than usual owing to the drought that prevailed there last summer.

The results from the beets grown at Ottawa show a decided improvement over those of 1905, which it may be remembered was a rather exceptional season and one not conducive to the proper ripening of the beet.

The beets from the Farm at Brandon are of very good quality, both as regards richness in sugar and purity of juice. The data are considerably higher than those obtained from the crop of 1905.

Very satisfactory results, as far as analysis is concerned, were obtained from the beets grown at Indian Head, Sask., though the co-efficient of purity is decidedly lower than that of the Brandon beets.

Though not equal to the crop of 1905, the beets grown at Agassiz this past season may be considered roots of fair average quality and sufficiently rich for factory purposes.

In the following table we present the average results, as regards the percentage of sugar in juice, from the three varieties, Vilmorin's Improved, Klein Wanzleben, the Très Riche, grown on the Experimental Farms for the past five years:—

AVERAGE Percentage of Sugar in Juice in Sugar Beets Grown on the Experimental Farms, 1902–1906.

Locality.	1902.	1903.	1904.	1905.	1906.
Nappan, N.S.	15·87	15·33	14·41	16·52	17·08
Ottawa, Ont.	16·77	15·34	16·91	12·45	14·37
Brandon, Man.	....	11·36	16·62	11·09	15·50
Indian Head, Sask.	15·15	16·54	15·24	14·94	14·91
Agassiz, B.C.	....	17·44	8·10?	17·32	14·23

A careful survey of our work in this connection since the establishment of the Experimental Farms has shown that an intimate relationship exists between seasonal conditions and sugar production. Inherited richness (obtained by breeding and selection) and the culture which the beet receives are undoubtedly important factors, but looking back over the records of the past 19 years, I think our data will serve to demonstrate the susceptibility of the beet to excessive or abnormal rainfall and temperature, especially during the autumn months. Dr. H. W. Wiley, Chief Chemist, Department of Agriculture, Washington, D.C., U.S.A., has for many years been studying the effect of various factors—altitude, temperature, &c.—upon the sugar content of beets and from his published results I gather that his conclusions and ours are in the main identical. It would seem that ideal climatic conditions for sugar production include a moderate and well distributed rainfall during May, June, July, and August, with fairly dry weather in September and October, when the beets are maturing; and, further, that a low mean summer temperature, say, 60° F., with few sudden or great changes in the latter part of the season are especially conducive to a high sugar content. In every instance where the percentage of sugar has fallen exceptionally low we have been able to trace the cause to what might be termed abnormal weather conditions; similarly, very high percentages have been found to follow good seasons—that is, those that conform more or less closely with those just described as particularly favourable for the sugar beet.

THE IDEAL BUTTER SEPARATOR.*

This, it is claimed, is 'a new invention which will produce a maximum quantity of pure butter from sweet or sour milk and cream in five to ten minutes.' After giving a description of the churn, or separator as it is called, the printed circular advertising the machine proceeds to explain the process in the following language: 'The butter is separated by the combined action of the agitation of the dasher and the aeration of the air. The air is sucked down from the outside to near the bottom of the milk or cream, where it is distributed by centrifugal action and bubbles up, causing the separation of the butter globules.'

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* Manufactured by the Iroquois Machine Works, Iroquois, Ont.

To avoid any suspicion of exaggeration on the part of the writer regarding the seemingly extravagant claims made for this churn the 'advantages' as set forth in the circular already referred to are given, as follows:—

'1.—More butter is produced from a given quantity of milk or cream than by any churn. This is because it separates the globules of butter from the cream without breaking them. The old process broke them up by the continued friction produced by agitation.'

'2.—The butter will keep better since it is pure and has been thoroughly aerated. It has no mixture of casein or milk in it.'

'3.—The residue is pure and sweet and may be used for table use.'

'4.—The separation is more rapid than any other separator and the air introduced is always pure and does not bubble through more than once. This is because the air is drawn from outside the vessel.'

'5.—The gearing is simple and a child can operate it with safety. No cogwheels to catch the fingers.'

'6.—No casein, albumen or impurity in the butter. It is not possible to remove these by any other process. The ordinary churning beat the butter-fat into an oily mass containing all the impurities such as casein and albumen. The Ideal Separator causes the butter globules to form separately and cohere together. The butter will thus not become rancid or smell offensively.'

In order to ascertain how far the claims made for this invention might be supported in practice, a series of tests or trials have been carried out according to the printed directions, using cream and milk, both sour and sweet. This investigation, as far as the butter-making was concerned, was conducted at the dairy of the Experimental Farm, the work of manipulation from the beginning to the end of the process being left entirely in the hands of a representative of the Iroquois Machine Works, sent specially for that purpose. The weight of the cream or milk used in the tests, of the buttermilk and washwater, and of the resultant butters were all checked by the writer, who also took notes of temperatures, &c., throughout the various operations. Samples of the creams and milks used, of all the by-products, and of the butters were taken and subsequently submitted to analysis in the Farm laboratories.

It is thus evident that all the necessary data were carefully obtained for tracing the butter-fat throughout the whole process, and thus to learn with what degree of economy butter could be made by this process.

For convenient reference, the weights, temperatures, and the chief analytical data will be presented in tabular form, the following notes supplying all other necessary information regarding the working of the process in the several trials.

NOTES ON THE PROCESS.

Trial 'A.' Sour or Ripened Cream.—At the time of churning this cream was one day old. It proved on analysis to contain 20·41 per cent fat. After it had been agitated in the machine or churn for a few minutes the operator added a quantity of water at 70° F., claiming that the cream was too thick for satisfactory working. The butter gathered in about 8 minutes, when the granules were about the size of small wheat. The buttermilk was then drawn off and wash water at 52° F. poured on the granular butter in the churn. After a few turns of the dasher this wash water was run off, the butter taken out and worked on the table, salted, weighed and sampled, and the remainder placed in the cool storage room in order that its keeping qualities could be subsequently ascertained.

Trial 'B.' Sweet Cream.—This was freshly separated cream. As in Trial 'A,' the operator added a large quantity of water at about 70° F. to the cream in the churn. Ten minutes sufficed for the churning. Very considerable difficulty was experienced in removing the butter, which adheres to the dasher and rotating disc—the construction of the machine being such that some loss of butter must invariably follow from this cause. It was found that only by the use of hot water could the internal parts of the apparatus be perfectly cleansed of butter-fat.

Trial 'C.' Sweet Milk.—This was started in the churn at a temperature of 72° F., and the butter began to gather in 5 minutes. It was evident, however, from the appearance of the milk that the separation was imperfect, and the operator continued further churning for half an hour, during which time the temperature fell 10 degrees. The granules were very small, oily and refused to properly coalesce. The operator claimed that this, for some unknown cause, was an unsatisfactory test, and he was allowed to repeat it with a fresh quantity of milk (Trial 'C1'). All the weights were, however, taken and samples of the by-products and butter collected for analysis, so that data would be available for the determination of the loss of butter-fat.

Trial 'C1.' Sweet Milk.—This milk was somewhat richer than in the previous test. It was churned at a temperature of 71° F., and the butter began to gather in 10 minutes. Though a more satisfactory test than 'C,' the granules were exceedingly small and of a more or less oily consistency, making it extremely difficult to remove the butter from the churn.

Trial 'D.' Sour Milk.—This milk was 24 to 30 hours old when churned. The time of churning, 10 minutes. The granules were very small and refused to gather, and, as in the case of 'C.' and 'C1,' had to be collected on a fine sieve. From the appearance of the drawn off buttermilk, it was evident that there was a considerable loss of butter-fat—and this fact had been noticed in all the previous trials save 'A' with sour cream. The subsequent analyses proved the correctness of this conclusion.

DISCUSSION OF THE DATA AND CONCLUSIONS.

To the butter-maker the tables here presented will require but little explanation; it may serve a useful purpose, however, to emphasize one or two of the more important facts they disclose and which we are obliged to admit are directly against this method of butter making.

TABLE I.—THE IDEAL BUTTER SEPARATOR.

(The 3-gallon size machine was used in all the trials.)

Trial.	Weight of Cream or Milk taken.		Fat in Cream or Milk.		Buttermilk.			
			Per cent.	Total Weight.	Weight.		Fat in Buttermilk.	
							Per cent.	Weight.
	Lbs.	ozs.		Ozs.	Lbs.	ozs.		Ozs.
A—Sour cream	22	15	20·41	74·9	23	9½	·27	1·0
B—Sweet cream	26	14½	29·68	127·8	53	0	1·05	8·9
C—Sweet milk	25	8	5·19	20·9	28	0	1·65	7·4
C¹—Sweet milk.	15	2	5·78	14·0	15	6	1·37	2·0
D—Sour milk	25	0	4·59	18·4	20	7½	1·09	3·6

Trial.	Wash water.				Butter.			
	Weight.		Fat in Wash water.		Weight.		Fat in Butter.	
			Per cent.	Weight.			Per cent.	Weight.
	Lbs.	ozs.		Ozs.	Lbs.	ozs.		Ozs.
A—Sour cream	22	9½	Traces.	Traces.	5	12	79·89	73·5
B—Sweet cream	26	7½	Traces.	Traces.	8	14½	81·48	116·1
C—Sweet milk	31	1	·29	1·4		10½	82·61	8·7
C^1—Sweet milk	14	10	·01	·06		11¼	82·93	9·3
D—Sour milk	25	5½	·105	·4		14¾	82·31	12·1

Table 1.—This shows that in all the trials except that with sour cream there was *an excessive loss of butter-fat in the butter-milk.* Butter-milk, ordinarily, contains between ·1 per cent and ·2 per cent fat—in four of these trials it was between 1 per cent and 2 per cent. Owing to the proportionately large amount of butter-milk in these trials—due to water added during churning—the loss of fat in this by-product is much greater than is indicated even by these high percentages. Thus, in the case of the sweet cream churning, of the 128 ounces (approximately) of butter-fat in the cream used, 9 ounces (approximately) were found in the butter-milk—with an ordinary churn and good work the amount of fat in the butter-milk would not exceed ¾ ounce. But bad as this is, the showing is much worse with the milk, both sweet and sour. Leaving out of consideration trial 'C,' which it might be held was not representative, we find with sweet milk one-seventh, or more than 14 per cent of the total butter-fat in the butter-milk, and with the sour milk, one-fifth, or 20 per cent of the total fat was lost in the butter-milk.

TABLE II—DETAILS OF CHURNING.

Trial.	Temperature.		Time of Churning.	Size of Granules.	Temperature of Wash-water
	Before Churning.	After Churning.			
	°F.	°F.	Min.		°F.
A	70	70	8	Small wheat	52
B	69	69	10	Wheat.	52
C	72	62	5 to 8	Millet.	50
C^1	71	69	10	Millet.	50
D	69	69·5	13	Millet.	52

Table II.—Affords a partial explanation at least of the loss in the butter-milk just referred to. It reveals the very high churning temperatures used in this process. Ordinarily, this temperature is about 50 degrees F. Higher temperatures, it has been shown, tend to the escape of fat in the butter-milk. This well-known fact being pointed out to the operator, he stated that the machine required the cream or milk to be about 70° F. for a satisfactory churning—by which the writer presumes he meant that butter could not be obtained in the time specified unless the cream or milk were at this high temperature.

The temperature of the wash-water, it will be noticed, also was higher than customary—about 10 degrees above the temperature of the wash-water as used in the dairy of the Experimental Farm. As a result of this high wash-water temperature, in conjunction with the high churning temperature, we might with confidence predict that butter would be obtained containing a large quantity of water.

TABLE III.—COMPOSITION OF BUTTERS.

Sample.	A.	B.	C.	C^1.	D.
Water	16·68	15·97	13·99	14·41	15·64
Fat	78·89	81·48	82·61	82·93	82·31
Salt	2·29	1·37	1·60	1·27	·58
Curd	1·14	1·18	1.80	1·39	1·47
	100·00	100·00	100·00	100·00	100·00

Table III.—The correctness of the conjecture made in the preceding paragraph is well supported by the high percentages of water in these butters. In one instance the water exceeds the legal limit; in two cases the percentages are dangerously close to this limit and in the two remaining butters from fresh milk the percentages are 13·99 and 14·41—considerably higher than is desirable for butter with good keeping qualities.

In other respects the butters are fairly normal. The percentages of curd present show that the claim that the butter made by this process is free from this constituent, falls to the ground.

TABLE IV.—ECONOMY OF THE PROCESS.

Trial.	Total Weight of Fat in Cream or Milk.	Total Yield of Butter.		Over-run Percentage.	Fat Recovered in			Total loss of Butter Fat.	Percentage loss of Butter-fat
					Butter.	Butter-milk.	Wash-water.		
	Ozs.	Lbs.	ozs.		Ozs.	Ozs.	Ozs.	Ozs.	
A.	74·9	5	12	23	73·5	1·0	Trace.	1·4	1·9
B	127·8	8	14½	11	116·1	8·9	Trace.	11·7	9·1
C	20·9		10½	....	8·7	7·4	1·4	12·2	58·3
C	14·0		11¼	....	9·3	2·0	Trace.	4·7	33·6
D	18·4		14¾	......	12·1	3·6	·4	6·3	34·2

Table IV.—This is a most instructive table, since it traces the butter-fat throughout the whole process and gives the amount and percentages of the loss of this very important constituent that occurred in the several trials. Using sour or ripened cream, this loss is almost 2 per cent; with sweet cream it amounts to 9 per cent of the total butter-fat. If we except the 'unsatisfactory' trial 'C,' the loss with sweet and sour milk is 33 per cent and 34 per cent, respectively—practically two-thirds only of the butter-fat is found in the resultant butter.

If the weight of the fat in the butter-milk and wash water be added to that contained in the butter and the sum compared with the amount in the cream or milk placed in the churn, it will be found that in each trial there is a weight of fat varying from ·4 ozs. to 3·4 ozs.—to be accounted for. This represents largely the butter-fat unavoidably lost in the apparatus. It has already been remarked that owing to the construction of the machine it is impossible to remove *all* the butter from the mechanism of the churn. Every effort was made to accomplish this, but it was very evident to all present that a considerable loss must ensue from this cause. Hot water was required to thoroughly cleanse the mechanism (dasher and disc) of fat before proceeding to the next trial.

In conclusion, as far as our investigation gives proof, the only claim made good is that regarding the time of churning. The process appears to be one of the most wasteful of all those that have been put forward to supercede the ordinary or orthodox methods of butter-making and which have been examined in the Farm laboratories during the past twenty years.

INSECTICIDES AND FUNGICIDES.

NEW FORMS OF KEROSENE EMULSIONS.

In an investigation carried on about a year and a half ago to ascertain the emulsifying effect of certain materials—and more particularly lime, as advocated by Professor Close—in the preparation of Kerosene Emulsion, it occurred to the writer that flour might answer for this purpose of holding coal oil in suspension. Experiments proved this to be the case, a very satisfactory emulsion for immediate use resulting. Eight ounces of flour were found sufficient to hold in perfect suspension one quart of coal oil. The emulsion is simply and easily made as follows:—

The requisite amount of coal oil (Kerosene) is poured into the pail or barrel and flour added in the proportion of 8 ounces to 1 quart of coal oil, the mass thoroughly stirred and the water added—2 gallons for every quart of coal oil. The whole is then vigorously churned, say for 5 minutes, by means of pump and coarse nozzle or a wooden paddle or dasher as used in upright churns—and the emulsion is ready for use. The spray is smooth, easily atomized and does not clog the nozzle.

During the last few weeks, this investigation, at the suggestion and with the assistance of Mr. Macoun, has been extended to the preparation with flour of certain sprays that might prove useful both as insecticides and fungicides,—Winter washes to be employed on dormant wood only and sprays that would combine the properties of Bordeaux mixture and Kerosene Emulsion for summer use. The following notes give briefly information regarding the emulsions which it has been thought might be serviceable to the fruit grower.

WINTER WASHES.

Bluestone 1 per cent, Kerosene 10 per cent.

Formula:

Bluestone	4 lbs.
Flour	8 "
Kerosene	4 gals.
Water	36 "

Mix the flour with the kerosene, as before described. The bluestone being dissolved in the water, pour about one-half of the solution, (the exact quantity is a matter of no moment) on to the Kerosene-Flour mixture and churn for 5 minutes. Pour in the remainder of the bluestone solution, stir, and the emulsion is ready for use.

On standing this spray separates into two layers, which, however, are readily remixed by stirring. Free oil does not appear, if the churning has been efficient, for at least 20 hours.

Caustic Soda 2 per cent, Kerosene 10 per cent.

Formula

Caustic Soda	8 lbs.
Flour	8 "
Kerosene	4 gals.
Water	36 "

Caustic Soda 2 per cent, Kerosene 5 per cent.

Formula

Caustic Soda	8 lbs.
Flour	8 "
Kerosene	2 gals.
Water	38 "

Caustic Soda 1 per cent, Kerosene 5 per cent.

Formula

Caustic Soda	4 lbs.
Flour	4 "
Kerosene	2 gals.
Water	38 "

It will be noticed that these three emulsions contain the same ingredients, but differ in strength, *i.e.,* in proportion of caustic soda and kerosene. The preparation is alike in all. The flour and the kerosene being mixed in the desired proportion, the solution of the caustic soda (lye) is poured on and the whole churned for 5 minutes. They are all remarkably stable, no free oil appearing after standing for 4 days, save in the case of the last formula, which contains but 4 lbs. flour per 40 gallons. The stability or permanence of these emulsions is undoubtedly due to the action of the caustic soda on the floor, making a viscous fluid which is eminently adapted for holding the coal oil in suspension.

SUMMER SPRAYS.

Bordeaux and Kerosene.

Formula

Bluestone	4 lbs.
Lime	4 "
Kerosene	4 gals.
Water	36 "

This is the usual Bordeaux mixture plus 10 per cent kerosene. It is best made as follows: To the freshly slaked lime add one-half the total volume of water and pour in the requisite amount of coal oil, emulsify for 5 minutes, then pour in the remainder of the water, in which the bluestone has been dissolved, and stir well for 1 minute. Though on standing a thick creamy layer forms, there is no separation of oil for at least 24 hours and simple stirring is all that is necessary, within a few days of making, to bring about a perfect mixture.

Bordeaux, Flour and Kerosene.

Formula

Bluestone	4 lbs.
Lime	4 "
Flour	4 "
Kerosene	4 gals.
Water	36 "

This, it will be observed, is the Bordeaux Kerosene Emulsion just described plus flour. To the diluted slaked lime the kerosene containing the flour is added and the whole emulsified, for 5 minutes; the solution of bluestone (approximately one-half of the total volume) is then poured in and the whole well stirred. This is a particularly stable emulsion, no free oil showing after two months. The thick layer that had separated at the end of this period, and which contained the oil, readily mixed again, forming a perfect emulsion. As a spray furnishing at once Bordeaux mixture and coal oil—a combined fungicide and insecticide—one simply made and of excellent keeping quality, this formula gives great promise. Certainly from the standpoint of preparation and the laboratory tests it leaves nothing to be desired.

COMMERCIAL BLUESTONE.

The fact that there was a larger proportion of smutty grain in Manitoba and Saskatchewan in 1905 than for several years previous aroused a suspicion in the minds of many regarding the quality of the bluestone (sulphate of copper) used in treating the wheat. To ascertain what foundation there might be for this suspicion we considered it desirable to procure samples from farmers and dealers at various points in the Northwest, and submit them to analysis. This was done during the early months of 1906, the samples examined numbering about thirty.

Analysis of Commercial Bluestones*—1906.

Designation.	Oxide of Copper. — ($CuO.$)	Oxide of Iron. — (Fe_2O_3)
Pure copper sulphate	31·88	
Pure iron sulphate.......	....	28·74
Manitoba—		
C. Bros., Lenora	31·40	0·80
" "	31·02	0·86
W.H.M., Gilbert Plains	30·64	0·72
J.A., Turnbull	30·88	0·76
A. McP., Dauphin.....	30·70	0·94
A.B. & Co., Swan River	31·14	0·74
S. & S., Dauphin......	30·98	0·70
S. C., "	30·42	0·66
M. Co., Swan River. ..	31·78	0·50
J. G., Russell.	30·94	0·98
A. H., Hartney........	32·58	0·78
E. A. M., Mackenzie ..	31·36	0·64
T. M. H., Foxwarren ..	30·24	0·76
" " ...	30·12	0·80
" " ..	30·20	0·68
Manitoba—*Con.* :		
McG. Bros., Mackenzie	30·56	0·80
J. A., Roblin..........	29·66	1·10
M. G. T., Highbluff...	30·38	0·90
T. W. M., Portage la Prairie..............	30·60	0·76
J. O. C., "	31·78	0·78
H. L., Foxwarren......	31·08	0·52
M. B. J., Hamiota.....	31·46	0·74
Saskatchewan—		
——, Wapella.	....	0·85
A. M., Indian Head ...	....	0·93
D. & B., Langenburg ..	30·72	0·72
E. S., Fleming.........	30·94	0·30
J. B., "	31·24	0·36
L. L. D., Leofield	31·72	0·36
Ontario—		
W. T. M. Ottawa......	29·64	0·36

* The copper and iron present were determined and are returned as oxides; for the calculation of the results to sulphates it is only necessary to add that 31·88 per cent copper oxide corresponds to 100 per cen pure sulphate of copper and 28·74 per cent oxide of iron to 100 per cent sulphate of iron.

These data did not, in my opinion, reveal the presence of any adulteration, and all the samples were reported as commercial bluestone of the usual quality or grade.

This finding does not, of course, mean that these samples were chemically pure sulphate of copper; commercial bluestone invariably contains a small percentage of sulphate of iron and other impurities and the samples under examination proved no exception to the rule. The amount of sulphate of iron obtained varied from 1·04 per cent to 3·82 per cent, which percentages, as we have intimated, are not greater than those which have always been found in the ordinary bluestone upon the market.

Some years ago (1890) there was offered for sale in the Northwest a so-called 'Agricultural Bluestone,' which on analysis proved to contain a very large proportion of sulphate of iron—from 30 to 60 per cent. Experiments undertaken by us with this material—which differs from ordinary bluestone by the crystals being of a light greenish-blue colour—showed conclusively that it was much less effective in smut prevention than bluestone. Further investigation made it clear that sulphate of iron was practically valueless for smut destruction and consequently that its presence in any large proportion would considerably reduce the beneficial action of the bluestone. The amount in the ordinary commercial bluestone, however, in the writer's opinion, is not large enough to materially lower the value of the bluestone for the treatment of wheat. It may be added that no sample of 'Agricultural Bluestone' has been received at the Experimental Farm laboratory for a number of years, so that we may suppose this spurious article is not now for sale in the Northwest.

In many of the samples of bluestone received from farmers for examination the crystals were more or less covered with an efflorescence or white incrustation. This was taken as an indication of impurity or at all events of inferior quality. The formation of this incrustation is due to a loss of a part of the water of crystallization in the bluestone, due to exposure of the material to dry air. The extent to which this drying out occurs, or, stated otherwise, the amount of incrustation formed, will depend on the surface exposed, the relative dryness of the air and the length of the period the bluestone has been exposed. Bluestone kept in bottles or jars tightly corked or stoppered will not show this incrustation. This incrustation, however, implies no loss of strength, but rather the reverse, as weight for weight, this incrusted bluestone will contain somewhat more copper sulphate than the normal blue crystals. As such incrusted crystals readily enter into solution it may be used without hesitation and the solution will be found to be equally effective as that from the unchanged bluestone.

AGRICULTURAL TOUR IN BRITISH COLUMBIA.

In June, 1904, the writer, in company with Mr. J. R. Anderson, Deputy Minister of Agriculture for British Columbia, made a tour in that province with the view of obtaining from personal observation and inspection information regarding the agricultural capabilities and possibilities of certain districts—more particularly the Okanagan and Nicola Valleys, which were being brought prominently before the notice of incoming settlers. An account of this trip was given in the Annual Report of the Chemical Division of the Experimental Farms for that year. The knowledge of the various soils and of the climatic conditions under which the soils must be worked proved of such great value in helping those who had already taken up land and to those intending settling in these districts, that by direction of the Honourable the Minister of Agriculture, Ottawa, the writer made a further tour during the past summer to continue this agricultural survey, and more particularly with the object of traversing ground which was not covered in 1904 and which was coming into notice as fruit growing districts. Accordingly, in the latter part of last July the writer joined Mr. Anderson, in Victoria, to enter upon an itinerary previously agreed upon and which would more especially take us through the valley of the Columbia, the East Kootenay and the Boundary districts.

As on the former occasion meetings of farmers and fruit growers were held at all points where the settlement promised an attendance. In all, 38 meetings were addressed, the subjects for discussion being soils, their origin, nature and economic management; the value of legumes for soil enrichment; the control of soil moisture; fertilizers, their composition and profitable employment, and allied subjects. Mr. Anderson also gave addresses in connection with commercial fruit growing and institute matters. It is a great pleasure to record the enthusiasm and intelligence evinced by those attending these meetings. Many had to travel long distances to be present and it was very evident from the interest taken in the discussions that all were determined to benefit to the fullest degree by our visit. Such time during the day that was not spent in travelling from place to place was employed in going over the land, examining soils and collecting samples for future analysis, taking notes of the crops, water supply, &c., and in giving practical demonstrations in the field. This latter feature proved most attractive and apparently very helpful to the farmers and enabled us to gain much valuable information that could not otherwise have been obtained as to the practices and experience of those actually engaged in tilling the soil.

Vancouver Island.—Before proceeding to the mainland, a few days were spent by special request in visiting certain districts in the vicinity of Victoria, and which had been omitted from the programme on the occasion of our previous survey tour.

The Saanich Peninsula, though containing a considerable area of rough, rocky and uncleared land, will undoubtedly become an important fruit growing district. Of all branches of agriculture it seems best adapted to this industry and from the acreage now being planted to fruit it will not be long before there is a considerable amount of produce for export. Apples, plums, cherries and strawberries—especially the latter—do exceedingly well and no doubt other fruits will be added to the list. Hitherto the land has been tilled chiefly in patches along the valleys, but the probabilities are that the slopes and higher grounds will be found even more suitable, chiefly by reason of the better drainage there afforded. In the lower lands potatoes and oats have up to this time been the main crops, to the detriment of the soil from depletion of humus and nitrogen and the loss of water-holding capacity. It is not unusual for this district in common with a large area in this part of the island to suffer from drought during the months of July and August. Hence, the necessity for fruit and vegetables of early and constant cultivation to form an earth mulch to check surface evaporation. Orchards in sod were found, as might be expected, to be a failure. All classes of soil were noticed, light, sandy and gravelly loams, clays and muck soils. The desirability of growing more clover, which succeeds admirably here, was pointed out for the two former, and the advantage of tile drainage for the heavier lands emphasized.

Metchosin.—The drive to Metchosin, which lies to the south of Victoria, was largely through a heavily timbered country containing many very fine trees. For the most part, the clearings seemed small and oats appeared to be the principal crop. The premature ripening of this grain gave evidence of the dry season, and examination of many of the soils showed that the effect of the drought had been accentuated by the small proportion of humus present. These matters furnished subjects for the address in the evening, in which was pointed out the desirability of adopting a rotation that would from time to time furnish humus. The value of cultivation and mulching for conserving moisture was also dwelt upon. This is a district in which as yet very little fruit planting has been done. With more attention to enrichment of the land, cultivation and mulching, however, there is no reason why this industry of fruit growing should not be more largely entered upon.

Pitt Meadows.—This was the first district visited on the mainland, being reached via Westminster Junction, where we were met by appointment by Mr. John Oliver, M.L.A. Mr. Oliver had been in correspondence with me for some time, giving me his experience regarding this district and forwarding samples of soil for analysis. He had made a special request that I should visit the 'Meadows' when next I went to British Columbia.

Pitt Meadows, situated at the confluence of the Pitt with the Fraser river, is of deltaic origin—the result of the deposition of the alluvial detritus brought down by the Pitt river. The 'Meadows' has an approximate area of 15,000 acres. A description of the soil formation by Mr. Oliver is as follows: 'The foundation on which this soil rests is first a quicksand found at a depth of from 8 to 10 feet from the surface, next follows a true river sediment on the top of which is soil composed largely of decayed vegetable matter mixed with river deposit; the nearer the surface the less river deposit is contained in the soil. In some places the river deposit shows on the surface, but there is an average depth of about a foot of muck and then follows the mixture of decayed vegetable matter with the river deposit.'

In traversing this area, or rather a limited portion of it, the writer found a considerable portion of the surface soil to be a silt of fine mechanical condition and rich in semi-decayed vegetable matter. As Mr. Oliver had pointed out, however, there were also large areas covered with muck deposits. These occurred in natural depressions in the Meadows and according to our measurements varied from 2 to 18 inches in depth, the greater number of our trial pits indicating depths of from 9 to 12 inches, the muck everywhere being underlaid by the river deposit. In many places there was no clear line of demarkation between the surface and subsoil, the one merging into the other.

Analyses made in 1894 of the surface soil collected where there was no overlying muck showed that this alluvial deposit was a silty clay loam possessing a large amount of vegetable matter and particularly rich in nitrogen and fairly well supplied with potash and phosphoric acid, but somewhat deficient in lime. I then reported that this soil, chemically and physically, might rank with the most productive soils on the continent, provided there was efficient drainage. The slight sourness might be neutralized with lime, and that in all probability phosphatic and potassic fertilizers would only be necessary where excessive cropping had been carried on without manuring. I suggested basic slag as the phosphoric fertilizer and stated that if it were employed there was no need of liming, since in addition to phosphoric acid it contained a considerable amount of free lime.

It is the areas covered with muck chiefly where failures have occurred. Analyses of this material, collected this year, have shown, as might have been expected, an excess of vegetable matter but slightly decomposed, traces of clay and sand and a general deficiency of mineral plant food. Such soil is undoubtedly difficult to bring into profitable cultivation, but with drainage and an intermixture with the underlying silt, it can in time be made productive. Basic slag and potash salts are the rational fertilizers for these areas, though, as has been proved by Mr. Oliver, a dressing of barnyard manure may be profitable, due no doubt to the fact that it furnishes a supply of immediately available nitrogen (not present in muck, though it is a highly nitrogenous material) and the further useful property of introducing bacteria whose function is to make ready the plant food for crops from the inert matter in the soil.

In the past, farming on the Pitt Meadows has only been carried on with partial success, depending largely on the character of the season. From my survey, and a careful consideration of the analytical data we have obtained, I am convinced that the chief trouble has been from the free water being too near the surface. It is quite clear that there is a necessity over a large portion of this area of lowering the water table. Signs of poor drainage, of sourness, were apparent, and I firmly believe that if by pumping the water-table were lowered those areas included by dykes could be brought into profitable cultivation. There is much latent fertility, especially in the river deposit; such land requires drainage and cultivation only to make it most productive. And for those parts in which an excessive amount of vegetable matter is present, there should be in addition the supply of the mineral elements by the means that I have indicated.

It is very encouraging to know that Mr. Oliver has commenced a series of experiments with various fertilizers. I am sure his results will be found most useful by those who are in this district, which is now very largely given over to hay growing and pasturing.

Upon our return to the railway station an impromptu meeting was held, a number of farmers having come together and brought samples of their soils with them. The character of these soils was explained and advice given on the several problems in soil management and crop growing that those attending had met with in their work.

Penticton and Keremeos.—From Westminster Junction we went to Penticton via Sicamous and the Okanagan route. Penticton lies at the southern extremity of Okanagan lake. The district in the immediate vicinity of the town is evidently destined to be one of great fruit production, though there is also a certain area well adapted to dairying. Comparatively speaking, this is a new country, and it is only within the last two or three years that extensive irrigation systems have been constructed, the land supplied with water and offered for settlement. This work of preparation is being actively pushed forward by the Southern Okanagan Company on the areas more particularly bordering on the lake and at the time of our visit settlers were fast coming in to take up lots which were chiefly of 10 to 20 acres. Quite a large area has already been planted with apple and peach trees and still more will be planted this spring. The summer had been exceedingly hot and dry, but where a sufficiency of water had been supplied the young trees had not suffered and judging by appearances, had made fair growth. Much of the land was surrounding the lake and is very similar to that of the benches higher up, as at Peachland and Fruitland, the character of which we discussed in our report for 1904, in our account of the Okanagan district. On small holdings devoted to fruit culture very few animals are kept and hence the supply of the manure will not be adequate for the soil's needs. It will be a matter of considerable importance to keep up the humus content of the soil by the occasional turning under of leguminous crops, for excessive cultivation will undoubtedly materially reduce the small supply now present. It is characteristic of a semi-arid district that the soils are not rich in vegetable matter, and the climatic conditions are against its accumulation. With a soil fairly rich in humus less irrigation water will be necessary, for it will then be more retentive of moisture. Undoubtedly much better results will be obtained by keeping the soil fairly well supplied with organic matter, followed by cultivation to check surface evaporation, than when irrigation is entirely depended on to furnish all the water required by the growing trees—for such invariably leads to surface washing, leaching of the plant food, and on the lower levels injury to vegetation from seepage.

In comparison with the prairie soils of the northwestern provinces these bench soils are not excessively rich in plant food; indeed, many of them are distinctly poor, but it is believed that subsequent analysis will show a considerable portion of their plant food to be in a more less available condition. Such is generally the case with soils in a semi-arid country. If this be so, it behooves those entering on these virgin lands to adopt methods that will minimize their depletion and exhaustion. These soils give exceptionally good returns at first, but the excessive use of irrigation water, with no return of humus-forming material will prove disastrous and render the fruit-grower in time entirely dependent on commercial fertilizers.

In this matter of fertilizers, I would not be misunderstood. Those who are purposing raising early vegetables and small fruits will undoubtedly find the judicious use of fertilizers profitable, but for apples and larger fruits especially such a course should scarcely be necessary, at all events until such time as the orchards are in bearing.

The soils that are lower—the bottom lands—and which we have spoken of as suitable for dairying are very much richer, and will need little or no addition of plant food for many years. Drainage and a rotation of crops are all that is at present necessary for very profitable returns. On them we saw many excellent crops of hay, roots, forage plants and oats.

Our thanks are due to Mr. W. T. Shatford, the local manager of the S. K. Co., who drove us over a considerable area of the land the Company had recently laid out in lots and planted, showed us their extensive irrigation system and generally supplied us with information respecting the district.

A very interesting and well attended meeting was held in the evening at which the nature of the soil and its rational treatment were discussed. Many local problems were brought forward and advice given as to the best means to meet the difficulty. Mr. Anderson gave a practical address on the planting and management of orchards, and in concluding outlined the benefits to be derived from the establishment of a farmer's institute and co-operative society, as regards marketing products.

From Penticton we drove to Keremeos, a distance of 35 miles, in the Similkameen valley. There has been but little land taken up along this route for agricultural purposes; much of it is sandy. In parts it is well timbered, but irrigation is necessary for agriculture, and this so far has only been possible in a very limited way at one or two points. About half way, Mr. Kitely has a small area planted, but unfortunately his supply of water was not of good quality; of good water the supply was apparently quite inadequate for the area requiring irrigation. Certain areas showed decided indications of alkali and it was evident that caution will have to be exercised that the water used for irrigation is not too highly charged with saline matter, or more harm than good will result.

Keremeos.—At Keremeos we were entertained by the pioneer settler of the Similkameen, Mr. Frank Richter, whose splendid orchards gave emphatic evidence of the great capabilities of this district as a fruit-growing country. Apples, peaches, apricots, nectarines, grapes, and other fruits all flourish here. The valley, about 18 miles long and from 1 to 2 miles wide, lies north and south, and is surrounded by mountains. Its situation seems favourable for the culture of tender fruits and no doubt the growing of early vegetables will prove very profitable. The mines at present take the greater part of the products of the land, but as the Great Northern Railway has now its construction as far as Keremeos, transportation facilities for export will soon be offered and there will be a large influx of those taking up land for fruit growing. The soil of the valley for the most part is excellent, decidedly richer than much we had seen in the semi-dry belt and no doubt has been largely formed by detritus brought down by the Similkameen river. The summer temperatures here are higher than those of the Okanagan and apparently there is no reason why fruits of a semi-tropical character cannot be grown successfully. Much land was being cleared of sage brush and being staked off into lots, which we understood were being taken up rapidly. Mention must be made of the magnificent growth of alfalfa here; a third crop on Mr. Richter's farm being at the time of our visit waist high. With irrigation, there appears to be no reason why this valley should not become a most flourishing district, the climate and, for the most part, the soil being very favourable to successful agriculture in many branches.

Returning to the main line of the C.P.R., the first stop-over was made at Vernon, where we visited several orchards and fruit ranches in the vicinity, giving advice on soils, water supplies and other matters that the residents of the district desired information upon. A very bad weed, the Prickly Lettuce (*Lactuca scariola*), it was noticed, had in many fields taken possession. It was evident that stringent measures ought to be taken at once for its eradication or its rapid spread would prove in the near future a serious menace to successful agriculture.

A largely attended meeting was held in the evening at which the use of commercial fertilizers was more particularly discussed. For bearing orchards and the forcing of early vegetables and tomatoes no doubt fertilizers, if employed with judiciousness, will in many cases be found profitable, but the soil for the most part is of such good quality that if the humus content is maintained, as by the turning under of green crops, we scarcely think they should be generally necessary.

It was a great pleasure to visit the Coldstream ranch, the property of Lord Aberdeen, and which for a number of years has been under the management of Mr. W. C. Ricardo. The orchards were in a flourishing condition, betokening the care and thoroughness with which all the operations on the ranch are carried on.

A considerable area of most desirable land has recently been put under irrigation and put upon the market by the Coldstream Estate Co., and this is being rapidly taken up by an excellent class of settlers. It will only be a few years before the output of fruit from this district exceeds manyfold that now exported.

From Vernon we drove to Armstrong, where we were met by Mr. Heggie, the president of the Spallumcheen Farmers' Institute, and the manager of the Stepney ranch. A meeting was held at which several local problems were discussed and we then proceeded to Enderby, stopping at a number of ranches on the way to inspect the soil and talk over matters with the farmers.

This is a district in which much heavy clay prevails, and I feel convinced from what I saw on this occasion as well as in 1904, that it is one which would be much benefited by more extensive irrigation than it now enjoys. Tile drainage here is also a matter of the greatest importance and should be more generally introduced. It is a district better adapted to dairying than fruit-growing. With improvement in the mechanical condition of the soil, corn would assuredly flourish. Again, we noticed that alfalfa made in general a meagre growth and gave but one crop in a season.

With irrigation and drainage we are confident that this most valuable crop would yield two or three cuttings in a season. In the past the impression has been that the rainfall is ample for all purposes, but on the occasion of both of my visits the district was suffering badly from drought. The initial outlay for irrigation and drainage would undoubtedly be repaid in a short time by the increased crop yields, and I placed this matter before the farmers in a strong light for their earnest consideration.

Revelstoke.—Very little agriculture on anything like an extensive plan has been done here. There are some small orchards set out, and dairying, chiefly to supply milk to the town, is carried on to a limited extent. The land is heavily timbered and unfortunately in clearing it much of the vegetable matter in the soil is being destroyed. The soil, generally speaking, is light and sandy and consequently the fire burns deeply, with the loss of the greater part of the humus and nitrogen that has been accumulating for centuries. This matter was explained fully at the meeting held in the evening and which was well attended. The use of fire in clearing the land is necessary, but by piling the brush in heaps it can be confined and a large area saved from its most injurious effects. Irrigation is not necessary here, there being an ample rainfall. Clover does excellently and should be more commonly used to enrich the soil, which, as already remarked, is of a light and open character. Climatic conditions are evidently suitable for cherries and plums, and experience no doubt will show that the district is one favourable for a large number of fruits and for dairying.

The Upper Columbia and the Kootenay.—From Revelstoke the train was taken to Golden, the starting point for our survey of the valleys of the Upper Columbia and the Kootenay. The journey from Golden to Cranbrook, a distance between 175 and 200 miles, was made by private conveyance in order to allow us the better to visit the ranches along the way, to examine the soils and make observations as to general conditions and possibilities of the district for agriculture. This trip occupied ten days.

Before leaving Golden, a few places in the immediate vicinity where orchard-planting had been begun were visited. The soil was generally light and gravelly—and clover-growing was advised to supplement the small supply of manure that was available. By request, we went over the hospital grounds with a view to making suggestions for their management. It is a pleasure to record our appreciation of the splendid order and care that this institution evinced in its administration both in the grounds and the hospital itself.

For some miles after leaving Golden the stage road follows the river closely, the valley being narrow. There is consequently very little settlement and ranches are small and only occur at comparatively long distances, more particularly at spots where the Rockies have receded, leaving a cultivatable area between their foothills and the Columbia. In places, however, valleys strike back into the mountains, affording opportunities for agriculture on a more extended scale. A projected railway, the Kootenay Central, from the main line of the C.P.R. to the Crow's Nest line is being constructed and we noticed that some 10 or 12 miles from Golden had been graded. When completed, a new impetus will be given to this valley, as at present besides the stage the only means of transportation is by steamer which plies during the summer twice a week between Golden and Windermere. At low water this service is irregular and uncertain and settlers have difficulty in reaching the landings. The expense attached to shipments and the necessary delay, it is stated by settlers, are now such that they cannot put their products upon the market profitably. Undoubtedly the advent of the railway will do much towards settling this valley, which has assuredly a future in the production of fruit, of dairy products and vegetables that will find a ready market in the Northwest. Settlement, as I have said, is sparse and irregular, but many no doubt will find when means of access are better that there are considerable areas of fertile soil that can be profitably cultivated.

At Spillimacheen, 18 miles from Golden, and at various points between that place and Briscoe, 50 miles out, the soil was of excellent quality, producing apples, and small fruits abundantly. At Briscoe we were entertained by Messrs. Mitchell Bros., who have made considerable progress. Their ranch is beautifully situated and it is being managed with intelligence. The soil here is a rather heavy clay. Cattle and sheep apparently do well on the native grasses. Mr. Henry Aitcheson's place was also visited. Small fruits and vegetables flourished with him and, from the prices mentioned, I should say paid well. Poultry also proved lucrative, as excellent prices for eggs could apparently be obtained at all seasons of the year. Hay was being baled here, showing that the cultivation of this crop on the large areas of the lower flats of the valley could be prosecuted. The growth of clover was very good, so there should be little difficulty in keeping up the fertility of the land economically.

From Briscoe we continued the drive to Windermere, about 40 miles, calling by the way at several ranches, making inspection of the soils and conversing with the farmers as to their crops, prospects, &c. Shortly after leaving Briscoe the character of the country begins to change—it is less wooded and the characteristic sage brush of the semi-arid belt appears and the soil is lighter. Irrigation becomes necessary, owing to inadequate rainfall, as we approached Windermere, but there are many streams from the Rocky mountains that can be utilized for this purpose. It was noticed that several of these were highly charged with carbonate of lime, giving rise on evaporation to deposits of this material. The purity of this carbonate suggests that on burning a good quality of lime could be produced.

Windermere is very pleasantly situated on rising ground overlooking the beautiful lake of that name. A young orchard just beginning to bear belonging to Mr. Kimpton, planted in a well protected valley about 2 miles from the village, was visited. This orchard gave great promise, the soil was excellent, there was plenty of water for irrigation and the trees had been well cared for. I was very pleased to see this ranch, for it served to demonstrate that successful, profitable orcharding could be carried on in this valley if only intelligence and industry were exercised—and provided water can be put on the land without too great an expense. Mr. Kimpton's homestead is in the village and here his garden betokens again the suitability of the country for vegetables and small fruits and his skill in raising them. To quote from Mr. Kimpton's record; 'Three pounds of Uncle Sam potatoes had produced 211 lbs.; 3 lbs. Carman No. 3, 237 lbs., and 3 lbs. Superior No. 7, 253 lbs.' Mr. Kimpton has gone extensively into poultry raising, which he finds pays well and he has also a large flock of turkeys which has proved particularly profitable. Several orchards are being planted in the vicinity, one belonging to Mr. R. R. Bruce looked very promising. The evil effect of excessive irrigation unaccompanied by drainage was well illustrated in a low-lying piece of ground. Alkali had appeared and no crop was possible where a few years ago excellent yields had been obtained.

From Windermere we paid a very interesting visit to the ranch of Mr. C. D. Ellis, across the lake. This is situated in a valley, the lower end of which is shut off by a dyke some 20 feet in height. The lower end of this valley is evidently the bed of an extinct lake. Mr. Ellis and his partner are about to cut a tunnel through this natural dam for the purpose of drainage and to prevent possible flooding at any future time. Much of the soil was of a mucky character and requiring drainage and mineral fertilizers, but the higher lands are of fair quality and gave evidence of considerable fertility.

A well attended meeting was held at Windermere, at which there was a good discussion of local problems.

Wilmer and Athelmer.—In company with Mr. R. R. Bruce we went to Wilmer and Athelmer on the west side of the lake, and drove over a large extent of the country and some eight miles southward as far as Mr. Kinnee's ranch, which lies in a valley and where some very fine crops were seen. There is a considerable area of plateau or bench land overlooking Lake Windermere on the west side awaiting the application of water. Irrigation will have to be undertaken on an extensive scale. For this there are two large streams available, Toby creek and Horse Thief creek, but the scheme is one that will involve a considerable expenditure. This land lies from 50 to 200 feet above the lake and should prove suitable for apples and other hardy fruits. As Lake Windermere is between 2,600 and 2,700 feet above the sea-level, tender varieties are naturally precluded. Very little agriculturally has, so far, been done about Wilmer, which has been a mining centre, but our meeting there was largely attended and it was evident from the interest in the various subjects discussed that in the near future a good deal of planting will be done. However, no extensive progress towards the opening up of the available land in this district will occur till the advent of the railroad and the scheme for irrigation is put through.

Fairmont.—Journeying southward from Windermere, our first stopping place was at Fairmont, where Mr. Brewer had some fine apple trees in bearing. His ranch had an ample supply of irrigation water from a large creek. He had found stock-raising profitable, cutting a large quantity of wild hay on the low lands of the vicinity. A splendid crop of clover—the third that season—was seen. It is evidently a country in which clover and alfalfa do well.

Thunder Hill was reached at noon, where Mr. Santo has a fine ranch, most beautifully situated. Garden produce was looking very well and some excellent poultry were seen, notes being taken of certain new crosses between White Wyandottes, Barred Plymouth Rocks, and Black Minorcas, which struck me as very good. The only other ranches in this district are those of Mr. Douglas Grainger and Mr. Hardwick Grainger.

Sheep Creek about 40 miles from Windermere was reached at nightfall. Mr. Alex. Emery has a small area under cultivation, but very little has been done here except cutting hay and raising some produce for local consumption and the lumber camps. The creek, however, is a large one and we were told there is a considerable area of land that could be cultivated, and for which water would be available, at some distance back from the road.

Soon after leaving Windermere the country loses in part its open character and is in places densely wooded, Douglas fir and poplar predominating. Reaching the Columbia lake, the Yellow pine (*Pinus ponderosa*) is seen and timber increases as one proceeds from Canal Flat to Wasa, where there is an excellent growth of larch with some Yellow pine and Douglas fir. We noticed that larch makes a fine growth all through this part of East Kootenay.

Wasa.—A stop-over of several hours was made at Wasa 26 miles from Sheep Creek, where there is an excellent up-to-date hotel kept by Mr. Nils Hansen, who has also a ranch and small orchard. The latter was suffering from too much irrigation water accompanied by insufficient drainage. As the trees were now old and worthless we selected a more suitable site on the slope of the hill on which Mr. Hansen will plant a new orchard. Above Wasa on the benches are the ranches of Mr. H. Barr and Peter Winfeldt, where good crops of grain and hay grown under irrigation were found. Small orchards on both places were doing fairly well, but it was quite evident here, as in several other ranches visited, that an elementary knowledge, at least, regarding the requirements of young trees is most desirable at the outset.

Fort Steele.—This was the next point reached; it is about 30 miles from Sheep Creek. This once thriving village is now almost deserted, owing to the decline in mining and the fact that Cranbrook, 12 miles distance on the Crow's Nest road, has attracted many of its inhabitants. Under the guidance of Mr. R. L. T. Galbraith, Government Agent, and Dr. Watt, we visited many of the ranches in the vicinity and learned that small fruits and vegetables were the chief crops, these finding a good sale in Cranbrook. We held a meeting here in the evening, at which about 40 attended. The chief difficulty appeared to be that the price of labour was so high and competition in truck growing so keen by the Chinese, who were tilling small areas, that profits were very small. In passing it may be noted that Chinese, wherever we found them, invariably made a success of their work in vegetable and small fruit growing, evidently due to their industry and the knowledge they have brought with them of this branch of agriculture. From what we saw, apples and cherries of the Morello type thrive well in this locality.

Cranbrook.—From Fort Steele we continued to drive to Cranbrook, about 12 miles, stopping en route at St. Eugene Mission, where we found garden crops and apples doing well. Cranbrook on the Crow's Nest line of the C.P.R. is a thriving town, with some fair agricultural land in the vicinity. In company with the Government Agent, Mr. Armstrong, we visited several ranches in the neighbourhood upon which vegetables and small fruits were raised. Apples also can be grown here, but their commercial success has not yet been proven. The altitude of Cranbrook, about 3,100 feet above sea-level, probably precludes the growing of tender fruits.

Nelson.—This was made headquarters for several days as it formed a central point from which we could conveniently visit ranches in the surrounding district. Great activity is here evident in the matter of opening up and selling land for small fruit ranches, and a considerable number of settlers have recently been attracted by the accounts of success of those few who planted some years ago, and whose trees are now producing fruit. Much of the soil is poor, being, generally speaking, light and sandy and in some places partially covered with boulders. Nevertheless, we found on most unpromising looking sites, vigorous trees producing splendid fruit of many descriptions. Evidently the climatic conditions are very favourable and more than counterbalance deficiencies in the soil. Available areas, on both sides of the lake, many of them necessarily small, are rapidly being taken up, cleared and planted and means taken to provide for the necessary irrigation. We pointed out the great desirability of more care in clearing the land by fire, so that as little as possible of its vegetable matter should be destroyed. It would be difficult to realize, unless one had seen it, the degree of success in fruit-growing that is possible under conditions that appear at first sight so unsuitable. The probability is that our analyses will show that while the total amount of plant food in the soil is comparatively small there is relatively a large proportion of it in a readily assimilable condition.

Two meetings were held here, both very well attended and at which a number of local problems in connection with soil management, irrigation and kindred subjects were discussed.

Slocan City.—This was the next spot visited and I was pleased to note considerable areas of very good land in the neighbourhood, and indeed, all along the Slocan river. As yet very little has been cleared and as it is fairly heavily wooded it will be some time before this district—one of great natural beauty, will be thickly settled. In time, Slocan City, now almost deserted through the decline in mining, should become the centre of an excellent fruit producing district. We saw some very fine apples, cherries (sweet), and plums, and in selected sites no doubt peaches and grapes would thrive. Tomatoes, Indian corn, and vegetables generally also did very well. On the lower lands dairying should be profitable, but many of these first require clearing and draining. Mr. Hall's ranch, about 6 miles distant, was visited and some advice given regarding drainage and soil management. Mr. Hall is making a success of dairying; everything was being done well and thoroughly and in a few years he will have a very fine ranch.

Mr. Anderson and I, in company with Mr. Dennis, visited a number of ranches, spending the day in field demonstrations. In the evening an interesting meeting was held at which there was a good attendance. As Mr. Anderson remarked; 'With the revival of mining and the fine lumbering facilities, the excellent opportunities for fruit-growing and dairying, the Slocan district would surely become of importance.'

Kaslo.—From Slocan we returned to Nelson and thence took the boat for Kaslo, a town which has also suffered through the decline of mining, but which has great possibilities for fruit growing, as available areas for planting are larger here than at most points in this part of East Kootenay. The soil for the most part is a red loam and stated to be excellent for fruit. In company with Mr. Cockle and a number of others a day was spent in visiting the recently cleared and planted areas in the vicinity. As yet fruit-growing here is in its infancy, but interest in this industry has been awakened and orchard planting is progressing fairly rapidly. Note must be made of the beautiful garden and grounds of Mr. George Alexander, where flowers and fruits were in abundance. Mr. Alexander is experimenting with a number of English apples, which so far, have given great promise. The meeting in the evening was given up to the discussion of topics of importance to those just starting orchards and fruit-growing, and it was very gratifying to note the intelligence, interest and enthusiasm evinced by the ranchers in this, for them, new venture.

Proctor.—From Kaslo we went to Proctor, where we were met by Mr. Renwick, the Government Agent, Mr. Proctor and others, and made an inspection of several newly planted orchards in this district. By means of a gasoline launch we were enabled to visit the larger number of ranches on both sides of the lake between this point and Nelson. With a few exceptions these were quite new, very little planting being seen more than two or three years old, and the greater part but one year old. The soil over a good deal of this area is light and sandy and in many places anything but promising, nevertheless where the trees had been supplied with a sufficiency of water good growth had been made. Unfortunately, in clearing the land a large proportion of its humus had been destroyed by fire and we consequently advised the more careful restriction of this agent, so necessary and yet so injurious in its effects on the soil, in the clearing up preparatory to planting. No doubt the ashes so produced have furnished a considerable amount of mineral plant food, very useful to the young trees, but it will be necessary to grow clover or some other leguminous crop to return the elements that have been destroyed and dissipated by the fire. A young orchard's requirements in plant food are but small for a number of years, and this undoubtedly accounts in a large measure for the progress the trees at first make, but as they come into bearing more attention will have to be paid to keeping the soil in good heart. As the supplies of farmyard manure will be very limited, leguminous cover crops turned under, supplemented by potash and phosphates will in all probability be the means used to ensure good yields. Many of the areas are on steep slopes and irrigation must be carefully done to prevent washing. Several samples of soil taken at various points were collected and forwarded to the Experimental Farm Laboratories, Ottawa, for future study.

In concluding this brief notice of the East Kootenay district, I must state that I was deeply impressed with its fruit-growing possibilities, not so much from the soil—though that from the mechanical standpoint is satisfactory—as from the practical evidences afforded in those orchards which have attained a bearing age. There can be little doubt but that favourable climatic conditions for the most part, must prevail for this industry. And I might remark in this connection that experience in other countries has shown that favourable temperature conditions with judicious irrigation can produce wonderful effects even when the soil is apparently very poor.

Grand Forks.—This, our next point, at the junction of the North and South branches of the Kettle river, is in the Boundary district. Here we spent several days visiting the farms and orchards in the neighbourhood. First we went over the pioneer orchard, planted by Mr. Covert and now in full bearing. It is now in the hands of Mr. Honsberger, who at the time of our visit was daily making large shipments of fruit. A large area is planted with prunes, which we were told had proved a most profitable crop. This ranch has its own water supply from Fourth of July creek. A portion of the original ranch has been laid off in lots of 10 and 20 acres, all of which are supplied with water laid on for irrigation by a system of piping. Several of these lots have been taken up and judging from the immense crops of fine vegetables and fruits there can be no doubt as to the excellence of the soil and the suitability of the district for the growing of a large variety of horticultural produce. Some very fine soil was noticed, but unfortunately through careless irrigation 'washing' had occurred at several places. The district also is one favourable to fodder crops, alfalfa fields bearing third crops, waist high, being seen.

On much of the lower land, adjoining the Kettle river, and contiguous to American territory there is at present no water supply for irrigation and the trees and the crops are consequently poor. A comprehensive scheme, however, is under serious consideration for pumping water from the Kettle river. When this is in force some 2,000 acres of very good land will be rendered available for fruit-growing and general farming.

The orchard and extensive nursery grounds of Mr. Martin Burrell were next visited. They are located about three miles from the town and beautifully situated on the lower benches of the Kettle and watered by creeks from the mountain. It is a pleasure to record the excellent condition in which we found the nurseries; the young stock was healthy and vigorous, though unfortunately a considerable loss had been sustained by an attack of the Flatheaded Apple Tree Borer. Very fine and luscious pears, plums and peaches, in abundance were seen in the older plantations, and the apples also, though this season not bearing so heavily, gave promise of a good crop. Much of Mr. Burrell's soil is of an excellent type, rich and light and well adapted to fruit-growing. With provision for irrigation this district will undoubtedly become one of the most productive fruit-growing areas in British Columbia.

In concluding this account of our tour I would say that this record of what we saw and did constitutes but the first part of the work I had in mind. The itinerary has put me in possession of information otherwise unattainable; it brought me into direct contact with the men tilling the soil and whom, I think, I am now in a better position to help with advice. Further, as time permits, the large collection of soil samples will be carefully analysed, and I have no doubt that this work will furnish many interesting and helpful data for future guidance regarding soil management and the nature of the fertilizers that may be necessary for the most profitable results.

To Mr. Anderson I am very much indebted. Without him the tour would have been much less valuable and far less pleasant. He is thoroughly conversant with the country we travelled over and his knowledge of local conditions and possibilities were of the greatest assistance to me every day of our itinerary.

NOTES ON THE CHARACTER OF THE SOIL BETWEEN LANGDON AND GLEICHEN, ALBERTA, IN WESTERN SECTION OF IRRIGATION BLOCK OF THE CANADIAN PACIFIC RAILWAY COMPANY.

At the request of Mr. J. S. Dennis, Superintendent of Irrigation, C.P.R., Calgary, Alta., I made a survey of the lands which this company are placing under irrigation between Langdon and Gleichen, and are now being offered for settlement. Between two and three days were spent in this work, at the conclusion of the tour just described, and from the notes taken during this rapid survey, I have prepared the following brief report. Later it is expected to examine chemically samples of the soils collected at various points in this district.

The first examination was made a few hundred yards north of the railway station at Langdon. The surface soil was found to be a black, heavy loam, evidently well supplied with humus (semi-decomposed vegetable matter), and containing such a proportion of clay as to constitute it a 'strong' soil. Technically, it would be classified as a clay loam. Several trials showed it to have a depth of from 4 to 6 inches. The subsoil is a heavy, chocolate coloured clay. The probabilities are that analysis would show considerable percentages of organic matter and nitrogen in this clay—at any rate for some few inches—as the surface soil, characterized by such rich stores of these constituents, passes without any strong line of demarkation into the subsoil.

Crossing the railway track, we drove to the company's farm (Sec. XV.) and inspected the soil at a number of points upon it and as far south as the secondary irrigation canal 'A.' The surface soil, apparently similar in all respects to that north of the railway track, had a depth of from 4 to 8 inches and was underlaid by the heavy, chocolate coloured clay already described.

Following east from Langdon along the Blackfoot trail, the soil was examined in four places between Langdon and the canal between sections 6 and 7, T. 23, R. 25. The soil throughout was extremely uniform in character, a black loam from 4 to 8 inches in depth, and underlaid by a heavy, chocolate coloured subsoil.

After crossing the ditch, an examination was made in N.E. ¼ Sec. 6, T. 23, R. 25, where the same heavy, black loam prevailed with a depth of 4 to 6 inches. The subsoil was practically identical with that found at points previously inspected.

Driving northwest towards Strathmore, an examination was made on Sec. 29, T. 23, R. 25, and no change of mark could be noticed either in soil or subsoil.

The next day we drove south from Strathmore and made the first soil inspection about 2½ miles from that place, on Sec. 3, T. 24, R. 25. A change in the texture of the soil was here observable—there was decidedly more sand, both in the surface and subsoil. Although lighter in character than that previously examined, the soil showed no appreciable diminution in vegetable matter, being deep black and well supplied with root fibre. The subsoil was of a sandy nature. In a depression or hollow, 15 inches of black, sandy loam was found, but on the upland the depth of the surface soil did not vary to any degree from that already noted.

Turning northward, two inspections were made between the latter point and Strathmore, the first on Sec. 3, and the second on Sec. 2, T. 24, R. 25. In both instances a deep, black sandy loam formed the surface soil, with a depth of about 6 inches, underlaid by a brownish-red sandy subsoil. The soil in the immediate neighbourhood of the C.P.R. Co. construction camp at Strathmore, was a black, sandy loam about 5 inches deep, underlaid by sand.

Proceeding to the company's farm, on Sec. 11, T. 24, R. 25, four to six inches of black, sandy loam was found to constitute the surface soil, underlaid by about 2 inches of sand, beneath which was clay. An examination at Secondary Canal, Sec. 12, T. 24, R. 25, showed a black loam, rather light in character, with a depth of about 3 inches with a sandy subsoil.

From Strathmore to Gleichen, the route lies southeast, the trail running north of lakes Eagle and Namaka, and in a general sense parallel to the C.P.R. track, though considerably north of it. On Sec. 1, T. 24, R. 24, the black loam that formed the surface soil was from 4 to 6 inches deep, and it, as well as the subsoil, was considerably heavier (less sandy) than in the neighbourhood of Strathmore.

From six to eight inches of a moderately heavy, black loam were found on Sec. 32, T. 22, R. 23, with a subsoil of comparatively stiff clay. A further trial pit was made on Sec. 23, T. 22, R. 23, and revealed a depth of about six inches of black soil underlaid by a distinctly heavy clay.

One examination was made east of Gleichen, on a breaking about half a mile from the village. Here there was a depth of fully eight inches of heavy, black soil underlaid by a chocolate coloured clay.

The lighter character of the soil in the neighbourhood of Strathmore, has already been remarked upon. With this exception it will be observed that the surface soil along the whole route travelled presented a certain well marked uniformity, more particularly noticeable in humus-content (as judged by the colour) and depth. Such uniformity constitutes a distinguishing feature of prairie lands. A more detailed and extended survey might show a greater variation than was noticed, and possibly analysis might disclose differences not otherwise detectable, but as far as examination allows a judgment, it would appear that the whole area traversed is overlaid by a surface soil rich in humus and plant food and bearing all the signs of a highly productive soil if provided with adequate moisture.

WELL WATERS FROM FARM HOMESTEADS.

The excessive drought that prevailed over certain areas, more especially in Ontario, during the later summer months of 1906, was undoubtedly answerable in a great measure for the unusually large number of samples of well-water forwarded for examination last year. Under such conditions the water in the farmyard and back-door well frequently becomes a serious menace to health. It is indeed a fortunate occurrence that such water, by its offensive taste, odour or appearance, often carries its own condemnation. The absence of such indications of pollution, however, must not be considered as evidences of purity. In the majority of cases the wholesomeness of a water can only be satisfactorily ascertained by a chemical analysis.

Of the 281 samples of water received, 90 were submitted to analysis, the remainder being rejected by reason of insufficiency in quantity or dirty bottles or corks. It is earnestly desired that those farmers desiring an analysis of their well-water should first obtain a copy of the instructions, forwarded on application to this Division, for the proper collection and shipment of the sample.

The 90 waters analysed were reported as follows: Good and wholesome, 28; Suspicious and probably dangerous, 21; Contaminated and totally condemned, 30; Saline, 11.

The value of an abundance of pure water for the farmer and dairyman can scarcely be overestimated. The relation of water to health is obvious when we remember the very important part that water plays in the nourishment of the body, that more than half the body weight is water, that the blood which bathes every tissue is very largely water, that the food is digested and assimilated by the aid of water, that the waste products of the body must be largely got rid of by means of water, and that this water, which we have seen becomes part and parcel of ourselves, is from the water we drink or take in our food.

Further, the health and thrift of the stock is largely dependent on the quality of the water supply. It is just as desirable, as necessary to have pure water for the farm animals as for man, and intelligent, progressive farmers have recognized this fact.

And, lastly, in the dairy, creamery and cheese factory, pure water is essential; indeed it is an absolute necessity if the dairy products are to be pure, of first class quality and flavour and keep well. There is an active movement on foot for the official inspection and analysis of the water supplies of all farms, dairies, &c., in Ontario, supplying dairy products to the public and I have no doubt but that such a measure would result in much benefit to all concerned.

ANALYSES OF WELL WATERS, 1906.

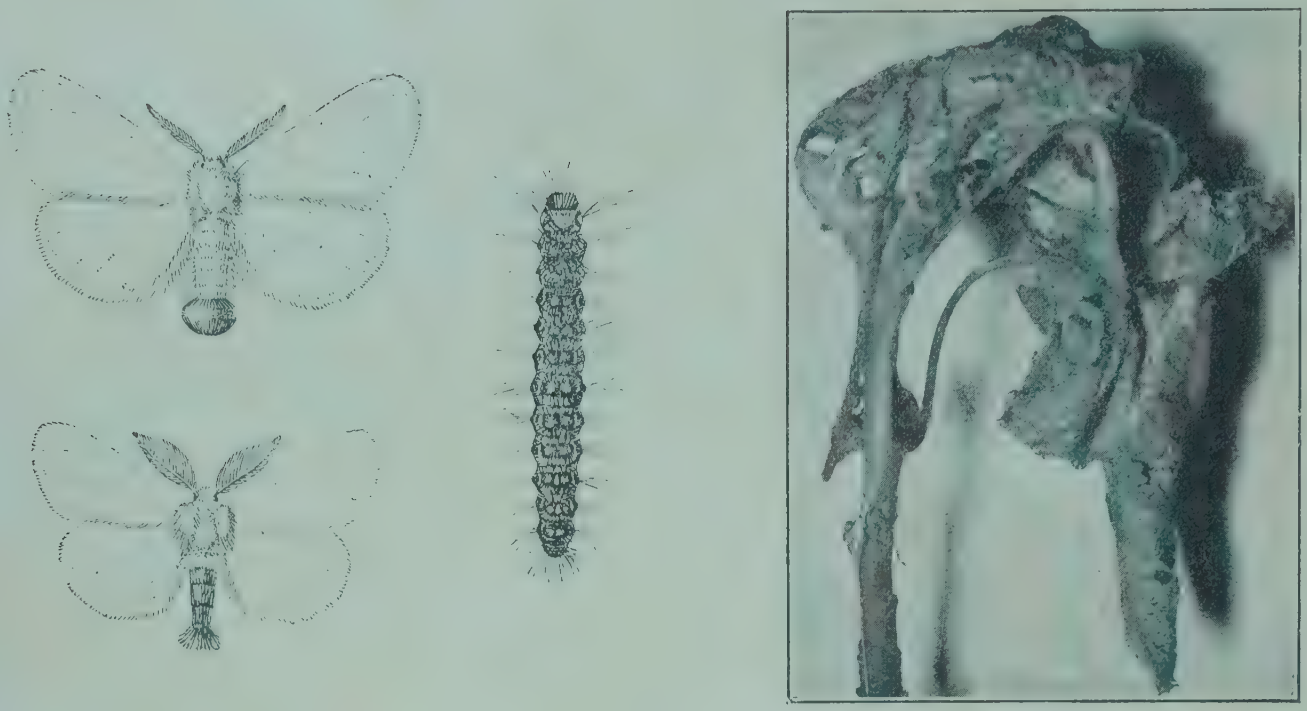
RESULTS STATED IN PARTS PER MILLION.

Number.	Locality	Marks.	Date.	Free Ammonia.	Albuminoid Ammonia.	Nitrogen in Nitrates and Nitrites.	Chlorine.	Total Solids at 105° F.	Solids after Ignition.	Loss on Ignition.	Phosphates.	Report.
			1906.									
1	Knowlton, Que	S. & J.	Jan. 23	Free.	·25	·181	Trace.	56·4	12·0	44·4	H. traces	Free from pollution.
2	"	"	" 23	Free.	·525	·194	1·0	99·2	14·4	84·8	"	" "
3	Portage du Fort, Que	G. E. R.	" 24	·075	·355	·968	1·0	154·0	78·0	76·0	"	Very suspicious.
4	Almonte, Ont	R. M. P	" 30	·23	·24	27·61	110·0	884·0	442·0	442·0	V. h. traces.	Dangerously polluted.
5	Carleton Place, Ont	M. A. Mc	Mar. 2	Free.	·07	1·91	8·5	311·2	207·6	103·6	"	Very suspicious.
6	Montmorency, Que	A. V.	" 17	Free.	·09	·238	1·0	92·8	55·6	37·2	Traces	Very good.
7	Medora Station, Man	T. A. T.	" 26	·915	·13	·16	22·0	1269·6	1005·2	264·4	V. h. trace	Contaminated.
8	Skaro, Alta	R. H. S.	Apr. 27	2·41	·937	None.	27·5	3512·0	2886·0	626·0	Traces	Saline water.
9	Dauphin, Man	F. B.	" 30	2·26	1·54	·115	2400·0	7606·0	6538·0	1068·0	"	" "
10	Arthurette, N.B	E. H. M.	May 7	Free.	·05	·115	Traces.	36·8	......	......	"	Pure and wholesome.
11	N. D. de Lourdes, Man	B. B.	" 21	1·465	·21	·086	1·0	366·4	198·8	167·6	Ppt	Very seriously contaminated.
12	Dauphin, Man	D. M. L.	" 28	3·25	·30	1·47	700·0	3374·8	3248·4	126·4	Traces	Saline water.
13	Portage du Fort, Que	R. & Co.	" 31	Free.	·05	·815	1·3	286·4	192·4	94·0	V. h. traces.	Excellent.
14	Upper Sheffield, N.B.	J. H. W.	" 31	·36	·04	·082	4·0	114·0	72·0	42·0	None.	Suspicious.
15	Rothbury, Sask	P. S.	June 7	·50	·145	·041	40·0	1317·2	885·2	432·0	Traces	"
16	Vernon, B.C	M. P. W.	" 7	·04	·155	·082	12·0	589·2	410·4	178·8	S. traces	Wholesome.
17	Barb, Ont	H. O. D	" 12	·15	·24	·065	19·0	211·0	93·0	118·0	Traces	Polluted.
18	Sperling, Man	J. H. H.	" 12	5·45	·625	·70	4450·0	9940·0	8678·0	1262·0	H. traces	Strongly saline.
19	Eastman's Springs, Ont	H. C.	" 16	7·79	·36	2·12	3400·0	6218·0	5896·0	322·0	V. h. traces.	Contaminated.
20	Varennes, Que	G. N.	" 27	·47	·32	None.	278·0	789·6	622·8	166·8	Trace.	Suspicious.
21	Vernon, B.C.	B. L. W.	July 3	·15	·08	·057	1·0	424·8	310·8	114·0	Traces	Very suspicious.
22	Ottawa East, Ont.	J. B. No. 1	" 4	·25	·145	·485	12·0	236·0	135·6	100·4	"	
23	"	" " 2	" 4	·335	·12	·514	10·0	224·8	124·0	100·8	Trace	
24	"	" " 3	" 4	·27	·125	·527	9·5	232·8	135·6	97·2	"	
25	Kemptville, Ont	T. A. R.	" 5	·18	·42	·119	......	520·0	366·0	154·0	"	
26	"	"	" 5	·16	·32	·053	......	......	......	......	......	
27	Gratton, Ont	F. K.	" 17	·27	·29	9·28	340·0	2092·0	1095·6	996·4	Trace	Seriously polluted.
28	Oyama, B.C.	S. H. P.	" 26	·067	·21	·241	29·0	930·0	700·0	230·0	Ppt	Rather suspicious.
29	Antigonish, N.S.	F. W. T.	" 31	·19	·295	6·497	55·0	312·0	259·2	52·8	H. traces.	Very seriously polluted.
30	Ottawa, Ont	G. C. E.	" 31	Free.	·055	·403	6·0	130·0	88·4	41·8	"	Wholesome.
31	Montreal, Que	F. D. M.	Aug. 2	·19	·205	Free.	24·0	818·8	574·8	244·0	Traces	Suspicious.
32	Stapleton, Ont	D. G.	" 7	1·03	·27	·016	12·0	476·0	352·0	124·0	"	Seriously polluted.
33	Ottawa, Ont	T. D. H.	" 10	·05	·13	11·22	32·0	503·2	297·2	206·0	"	Seriously contaminated.
34	Wrightville, Que	A. C.	" 14	·55	·70	·172	17·0	330·4	188·8	141·6	H. traces	Contaminated.
35	St. Eugene, Ont	W. J. McC.	" 14	·44	·25	·032	37·0	278·8	176·0	102·8	Free	"

ANALYSIS OF WELL WATERS, 1906—*Concluded.*

Number.	Locality.	Marks.	Date.	Free Ammonia.	Albuminoid Ammonia.	Nitrogen in Nitrates and Nitrites.	Chlorine.	Total Solids at 105° F.	Solids after Ignition.	Loss on Ignition.	Phosphates.	Report.
			1906.									
36	Sault au Recollet, Que	J. F.	" 30	2·0	1·17	·016	14·0	705·6	496·8	208·8	Traces	Dangerously polluted.
37	Ottawa, Ont	A. P. J.	" 31	·485	·65	Free.	6·0	350·0	196·0	154·0	"	Seriously contaminated.
38	"	A. B.	" 31	·06	·115	1·12	2·0	296·0	240·0	56·0	"	Contaminated.
39	St. Eugene, Ont	W. J. McC.	" 31	·345	·18	·02	54·5	383·2	239·2	144·0	"	Polluted.
40	Oak Lake, N.B	J. O. M.	Sept. 4	·01	·115	·848	9·0	134·4	71·2	63·2	V. sl. traces.	Suspicious.
41	Shawville, Que	G. P.	" 15	42·85	5·06	Free.	170·0	1865·0	1345·0	520·0	Traces	Dangerously polluted.
42	"	"	" 15	19·28	2·84	4·32	153·0	1237·6	977·6	260·0	"	" "
43	Perley, Sask	A. M.	" 15	·03	·20	·115	20·0	2394·4	1913·6	480·8	V. h. trace.	Suspicious.
44	Carrivale, Sask.	J. B.	" 15	·87	1·40	Free.	75·0	11644·0	8519·0	3125·0	Traces	Saline.
45	"	"	" 15	·41	·205	·32	203·0	838·0	665·0	173·0	V. sl. trace.	Polluted.
46	Ville Marie, Que	L. E. R.	" 20	·03	·16	·08	Free.	50·8	26·0	24·8	Trace	Excellent.
47	Snowflake, Man.	W. H. M.	" 22	2·095	·126	·263	170·0	1777·6	1766·4	71·2	H. traces	Saline.
48	"	J. F. D.	" 22	1·538	·115	·242	28·0	1595·6	1303·6	292·0	Trace	"
49	"	W. H. R.	" 22	·02	·345	·757	50·0	5750·4	4831·2	919·2	Traces	"
50	Deer Park, Ont.	C. E. S.	" 24	·09	·145	1·07	25·3	468·0	344·0	124·0	"	
51	Hintonburg, Ont	R. F. No. 1.	" 25	·02	·105	·065	9·0	289·2	183·6	105·6	"	Suspicious.
52	"	" " 2.	" 25	Free.	·11	·148	2·5	255·6	170·4	85·2	"	Wholesome.
53	"	" " 3.	" 25	·05	·125	·131	6·0	214·8	140·4	74·4	"	"
54	"	" " 4.	" 25	·07	·195	·123	7·0	368·8	244·8	124·8	"	Probably wholesome.
55	London, Ont	W. E. S. No. 1.	Oct. 8	1·81	·25	Free.	·5	360·0	213·6	146·4	Free.	Suspicious.
56	London, Ont.	" No. 2.	Oct. 8	1·48	·19	Free.	2·0	342·4	236·0	106·4	Free.	"
57	Forest, Ont	E. T.	" 19	·04	·485	11·07	125·0	778·0	625·0	93·0	"	Seriously contaminated.
58	Winchester, Ont.	H. A. W.	" 20	·05	·34	27·49	1675·0	3844·0	2955·2	388·8	Traces	" "
59	"	S.	" 20	·15	·23	18·01	230·0	1280·0	979·2	300·8	V. h. trace	" "
60	Knowlton, Que	T. P. W. No 1.	" 23	·05	·09	2·68	9·0	120·0	72·8	47·2	Free.	
61	"	" No. 2.	" 23	·07	·105	·106	1·5	89·6	40·8	48·8	"	
62	Hull, Que	A. McC.	" 24	·02	·105	·955	2·5	322·0	259·0	64·0	"	Wholesome.
63	Summerside, P.E.I	R. H.	" 29	Free.	·05	7·938	48·0	316·8	227·2	89·6	Traces.	Suspicious.
64	St. Johns, Que	J. A. L.	" 29	1·29	·085	Free.	56·0	405·6	335·2	70·4	"	"
65	St. George, N.B	J. D. W.	Nov. 5	·02	·12	7·494	60·0	328·0	160·0	168·0	"	Contaminated.
66	Utterson, Ont.	J. W. No. 1	" 8	·01	·155	·115	9·0	42·0	27·0	15·0	Free.	Wholesome.
67	"	" No. 2	" 8	·045	·33	5·91	10·0	207·0	102·0	105·0	Traces.	Very suspicious.
68	London, Ont.	W. E. S. No. 1.	" 12	1·725	·34	·573	·5	571·2	419·2	152·0	Free.	
69	"	" No. 2.	" 12	1·62	·16	Free.	1·0	416·4	273·6	142·8		
70	Quill Lake, Sask.	A. E. J.	" 12	·03	·21	·015	30·0	4224·0	3328·0	896·0	Traces.	Saline.
71	Winchester, Ont.	A. S.	" 13	·015	·15	12·513	235·0	1326·0	963·0	363·0	V. h. trace.	Seriously polluted.

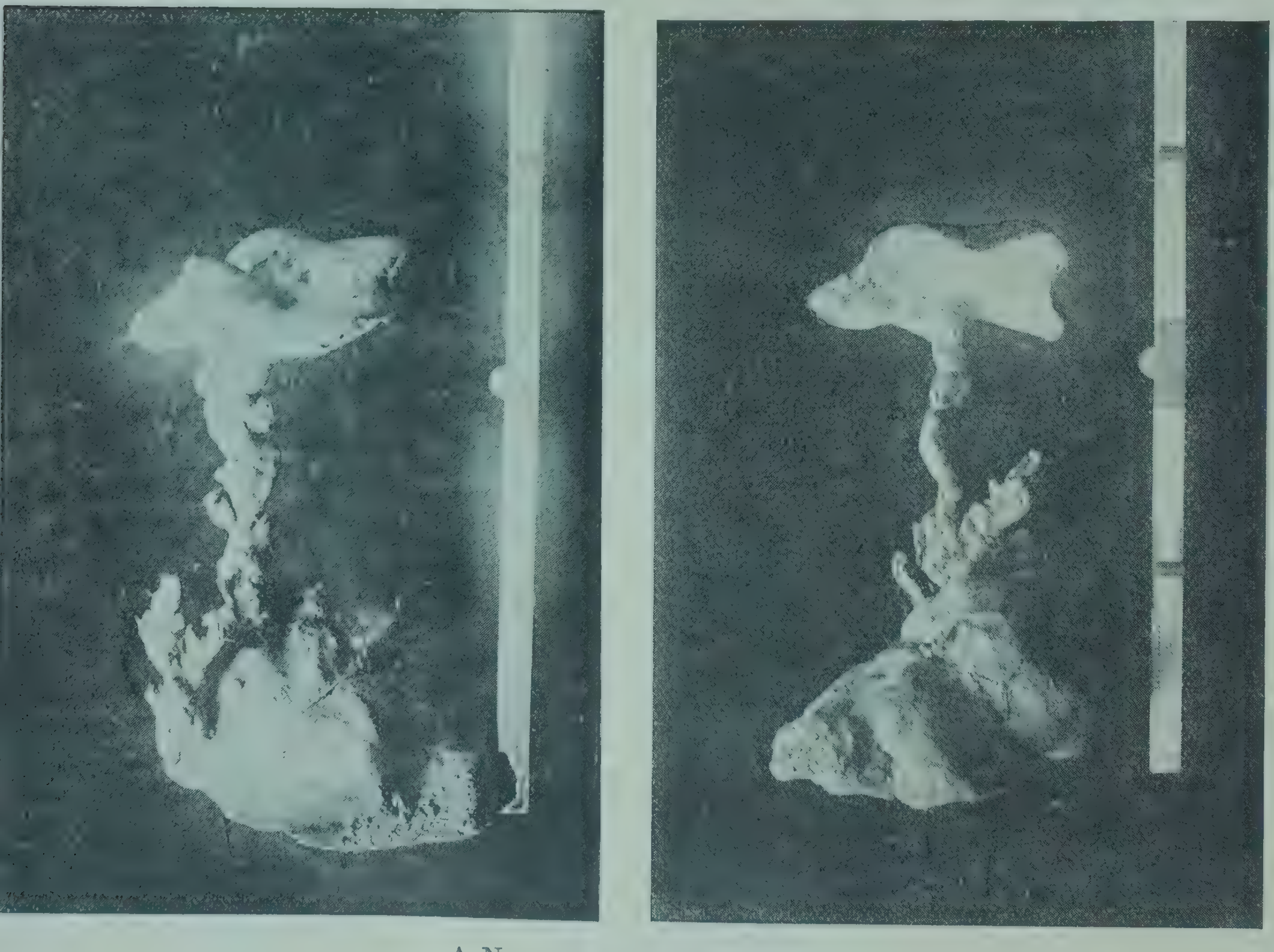
72	Bloomfield Stn., N.B....	G. R. No. 1.....	"	14	Free....	·06	10·902	130·0	464·4	335·2	129·2	Traces......	Very seriously polluted.
73	" "	" No. 2.....	"	14	Free....	·03	12·976	21·0	410·8	190·4	250·4	"	Contaminated.
74	" "	" No. 3.....	"	14	·04	·075	·033	7·0	40·0	23·2	16·8	"	Pure.
75	" "	F. W. T. No. 1..	"	14	·06	·145	10·08	35·0	437·2	212·8	224·4	"	Suspicious.
76	" "	" No. 2..	"	14	·08	·047	·675	5·0	128·0	88·0	40·0	"	Wholesome.
77	North Lancaster, Ont...	A. P. Mc.......	"	28	214·88	7·0	Free....	240·0	1608·0	1212·0	396·0	H. traces....	Most seriously polluted.
78	St. Johns, Que........	J. L.	Dec.	1	·965	·245	·022	52·0	380·8	298·4	82·4	V. h. traces.	Wholesome.
79	Hillier, Ont............	L. P. H.......	"	3	·016	·865	2·62	10·0	1868·4	1416·4	452·0	Traces......	Contaminated.
80	Craik, Sask...........	P. O. L.........	"	4	Free....	·645	Free....	200·0	8786·4	7384·0	1402·4	V. sl. trace..	Saline.
81	Ellisboro, Sask.........	R. D. P.........	"	5	·02	·80	Free....	50·0	8902·8	6932·4	1970·4	" ..	"
82	Appleton, Ont.........	E. W. F. C.....	"	10	Free....	·085	1·52	20·0	408·4	327·6	70·8	Free........	Contaminated.
83	Vankleek Hill, Ont.....	A. E. M........	"	18	·15	·095	Free....	Free....	290·0	203·2	86·8	Traces.....	Suspicious.
			1907.										
84	St. Hyacinthe, Que.....	A. B...........	Jan.	9	·39	·11	1·69	113·0	851·2	548·4	302·8	"	Seriously contaminated.
85	London, Ont...........	A. H. C........	"	10	·03	·365	·914	84·0	715·0	475·0	240·0	Free........	Decidedly suspicious.
86	Oka, Que.............	G. R...........	"	16	·01	·14	10·1	55·0	660·0	314·0	346·0	Traces......	Dangerously contaminated.
87	Sault au Récollet, Que...	J. F...........	"	25	Trace...	·02	Trace...	Free....	8·0	4·0	4·0	H. traces. ..	Excellent.
88	Clay Bank, Ont........	R. J. D. No. 1..	Feb.	4	Free....	·09	2·05	495·0	1262·8	1030·0	232·8	V. h. trace..	Suspicious.
89	"	" No. 2..	"	4	Free....	·14	·115	5·0	208·4	117·2	91·2	" ..	Free from contamination.
90	Sault au Récollet, Que...	J. F.......	"	7	Free....	·03	·51	6·0	358·8	241·2	117·6	Sl. traces...	Wholesome.



Female and male moths; full-grown caterpillar. Winter nest. (After Kirkland.)

THE BROWN-TAIL MOTH; *Euproctis chrysorrhœa*, L.

(Figures from Howard, U.S. Dept. of Agr. Farmers' Bull. 264.)



A NORTHWESTERN TUCKAHOE.

One specimen seen from opposite sides.

(Photographed by F. T. Shutt.)

REPORT

OF THE

ENTOMOLOGIST AND BOTANIST.

(JAMES FLETCHER, LL.D., F.L.S., F.R.S.C.)

1906.

OTTAWA, April 1, 1907.

DR. WM. SAUNDERS, C.M.G.,
Director of Dominion Experimental Farms,
Ottawa.

SIR,—I have the honour to hand you herewith a report on some of the more important subjects which have been brought officially before the Division of Entomology and Botany during the past fiscal year. There are a great many other subjects which have taken up some of the time of the staff; but as these have been either treated of before, or are as yet under investigation, they do not require special treatment in this report. The number of applications for information continues to increase year by year and the Division has become a recognized source for reference by all students of economic natural science and scientific farming. The farmers and fruitgrowers of Canada to-day, carry on their work in an entirely different manner from that which was generally adopted ten years ago, and there is a constant demand for accurate information as to the nature of plants grown for crops and as to the various enemies belonging to the animal and vegetable world which reduce the profits of the agriculturist and horticulturist. The value of a scientific knowledge on all matters related to farming has been recognized by the important place which has recently been given to nature study and similar subjects in the educational systems of the various provinces. The staff of the Division of Entomology and Botany have been frequently called upon, and have willingly given their services, to help school teachers, normal school students and pupils of all grades in their natural history work. Large collections of plants and insects have been received from such students from all parts of the Dominion. Many addresses have also been delivered to schools, drawing attention to the value of these studies and giving suggestions as to the best way of prosecuting them.

Collections.—The collections in the Division have been largely increased during the past season and have now been rendered much more complete and useful than they have been for many years. The entomological cabinets have been increased in number, and many specimens of insects have been taken from store boxes and mounted for arranging in their natural orders. This was made possible owing to extra assistance allowed me by the Honourable Minister of Agriculture for this special purpose. The collections have also been materially increased by valuable donations from several correspondents, amongst whom the following may be mentioned:—

Thos. Baird, High River, Alta.—Several specimens of rare western lepidoptera.

A. H. Bush, Vancouver, B.C.—A pair of *Lepisesia ulalume.*

J. W. Cockle, Kaslo, B.C.—Various insects in different orders, including many rare species.

Norman Criddle, Treesbank, Man.—Many specimens of rare Manitoban insects.

J. D. Evans, Trenton, Ont.—A pair of *Dytiscus circumcinctus.* These are interesting as coming from the type locality, Winnipeg.

Paul Hahn, Toronto, Ont.—A specimen of *Autographa surena* taken at Quebec.

C. Garrett, Calgary, Alberta.—Six specimens of *Erebia discoidalis.*

E. F. Heath, Cartwright, Man.—A large collection of Manitoban moths in papers.

R. V. Harvey, Vancouver, B.C.—British Columbian insects.

Wm. McIntosh, St. John, N.B.—Local lepidoptera from St. John, N.B.

L. E. Marmont, Rounthwaite, Man.—Several rare insects from Manitoba.

W. Metcalfe, Ottawa.—A large collection of flies taken at Ottawa.

J. Perrin, MacNab's Island, Halifax, N.S.—Rare lepidoptera from Nova Scotia.

T. W. Ramm, Ross Mount, Ont.—Two perfect specimens of *Basilona imperialis* taken at Ross Mount.

J. Russell, Digby, N.S.—Several rare lepidoptera from Nova Scotia including *Erora læta, Incisalia irus,* var. *arsace,* and *Hadena minuscula.*

Rev. G. W. Taylor, Wellington, B.C.—Some named specimens of British Columbian geometridæ and several noctuids.

E. P. Venables, Vernon, B.C.—Specimens of desirable species from the Okanagan valley, B.C.

E. S. Wilmot, Vernon, B.C.—*Apantesis superba.*

J. B. Williams, Toronto.—Larva of *Ecpantheria deflorata.*

T. N. Willing, Regina, Sask.—Lepidoptera and other insects from Saskatchewan.

F. H. Wolley-Dod, Millarville, Alberta.—Northwest insects.

C. H. Young, Ottawa.—Microlepidoptera and some noctuids.

The botanical collections have also been very much increased by mounting up specimens of species poorly represented or shown only from a single locality. These have been mostly from collections of previous years which had been stored away in the Division. The collections of weeds and weed seeds have been largely increased and the index of the Herbarium is now finished. The following donations for the Herbarium have been received:—

J. R. Anderson, Victoria, B.C.—Several rare British Columbian plants.

Norman Criddle, Treesbank, Man.—Seeds and botanical specimens of several desirable Manitoban plants.

W. M. Crawford, Millerton, N.B.—A fine series of the rare aquatics *Lophotocarpus spongiosus* and *Limosella aquatica* from New Brunswick.

J. M. Dickson, Hamilton, Ont.—Specimens of *Erythronium albidum* from Caledonia, Ont.

George Fraser, Ucluelet, B.C.—Rare plants from Vancouver Island, living roots and botanical specimens.

D. Gellatly, Gellatly, B.C.—Fungi collected as food by squirrels.

D. W. Hamilton, Kingston, N.B.—Desirable specimens of plants.

Miss I. Hargrave.—Rare plants from the interior of British Columbia.

J. J. Freeborn, Dundas, Ont.—Seeds and other natural history specimens from Dundas.

F. J. A. Morris, Port Hope, Ont.—A fine series of specimens of *Botrychium simplex* from Newtonville, Ont.

Mrs. D. W. Stewart, Renfrew, Ont.—*Medicago falcata* and other botanical specimens.

Geo. E. Sanders, Guelph, Ont.—Seeds of Canadian weeds.

Mrs. R. N. Stoker, Cowichan Lake, B.C.—A large collection of the seeds of rare British Columbian plants.

Meetings.—Meetings of farmers' institutes and other agricultural associations, teachers' associations, &c., have been attended and addresses delivered whenever other official duties would permit:—

April 17: Toronto.—Ontario Educational Association: 'Nature Study and Natural History.'

May 8: Ottawa.—Ottawa Horticultural Society: 'Insect Enemies of the Gardener and how to prepare for them.'

May 14: Petewawa, Ont.—Inspecting Central Camp and giving advice as to controlling sand.

May 17: Guelph, Ont.—Ontario Agricultural College. Address to Nature Study class: 'Life Zones and the Value of Nature Study.'

May 17: Guelph.—Ontario Agricultural College. Illustrated lecture to 3rd year students: 'Insects and Nature Study.'

May 29: Ottawa.—Address to Frœbel Union: 'Nature Studies for Kindergarten classes.'

July 5: Ottawa.—Summer School of Science. Address on 'Insects.'

July 9: Ottawa.—Summer School of Science. Address on 'Birds.'

July 12: Ottawa.—Summer School of Science. Address on 'Insects.'

July 16: Ottawa.—Summer School of Science. Address on 'Birds.'

August 29 and 30: Chateauguay Basin, Que.—Pomological and Fruit-growing Association of the Province of Quebec: 1. 'Fruit Insects of the season.' 2. 'House Plants and their Culture.' 3. 'The preparation of House Plants for Winter.' 4. 'Injurious Insects and their Control.'

December 12: Wolfville, N.S.—Fruit-growers' Association of Nova Scotia: 1. 'Insects Injurious to Nova Scotian Orchards in 1906.' 2. 'Nature Study and Natural History.'

December 17: St. John, N.B.—Natural History Society of New Brunswick: 'Insects, what they do and where they are found.'

December 19 and 20: Knowlton, Que.—1. 'Orchard Insects in the Province of Quebec in 1906.' 2. 'Garden Insects and their Control.'

January 19, 1907: Toronto.—Canadian Institute: 'Some things that every one ought to know about Plants and Insects.'

February 14: Ottawa.—McLeod Street Sunday School: 'The value of definite knowledge of common things.'

March 6: Ottawa.—Select Standing Committee of the House of Commons on Agriculture and Colonization: Evidence on the work of the Division and particularly on the San José Scale situation.

March 8: St. Catharines.—Niagara Fruit-Growers' Association: 'The San José Scale and its Control.'

March 8: St. Catharines.—St. Catharines Horticultural Society: 'Injurious Insects and their Habits.'

March 11: Toronto.—Address in the Normal School: 'Spring work in Nature Study.'

March 22: Ottawa.—Ottawa Ladies' College. Addresses: 1. 'Insects and Plants, Injurious and Beneficial.' 2. 'Knowledge of Common Things a Duty.'

March 26: Ottawa.—Normal School: 'Nature Study work with Birds.'

Correspondence.—The large correspondence of the Division has been of the usual varied character and shows a considerable increase in the number of letters received and answered. From April 1, 1906, to March 30, 1907, the number of letters, exclusive of circulars, registered as received, was 3,372, and the number despatched was 2,862. Of the letters sent out many are of the nature of articles for publication, as very frequently correspondents hand them to the local newspapers, so that their neighbours may have the benefit of the advice given concerning injurious insects or noxious weeds.

Acknowledgments.—I take pleasure in gratefully acknowledging my obligation to my many correspondents in all parts of the Dominion, to practical farmers who have much aided the work of the Division by promptly reporting outbreaks of injurious insects and noxious weeds, by sending specimens, and at request making observations upon points of special interest. My thanks are also specially due to the following specialists who have helped me on many occasions with the exact identifications of species of plants and insects which were unknown to me:

Prof. John Macoun, of Ottawa, for the identification of plants.

Dr. P. A. Rydberg, of New York, for identifying plants.

Dr. B. T. Galloway, Chief of the Bureau of Plant Industry, Washington, U.S., and the officers of his staff, for information concerning parasitic fungi.

Dr. L. O. Howard, Chief of the Bureau of Entomology, Washington, U.S., and the officers of his staff, for the identification of scale insects and species of various orders. I am under obligations to Dr. Dyar, and Messrs. Marlatt, Coquillett, Chittenden and Busck.

Dr. J. B. Smith, New Brunswick, N.J., who has examined and named large numbers of noctuids and other moths for this office and for Canadian collectors.

Mr. W. D. Kearfott, Montclair, N.J., who has been untiring in his efforts to help our collectors in the identification of microlepidoptera.

Mr. W. H. Harrington, Ottawa, for identifying coleoptera.

Dr. E. M. Walker, Toronto, for examining and naming large collections of Canadian odonata.

In conclusion, I have much pleasure in testifying to the assiduity and excellence of the work performed by my assistants, Messrs. J. A. Guignard and Arthur Gibson.

I have the honour to be, Sir,
Your obedient servant,
JAMES FLETCHER,
Entomologist and Botanist.

DIVISION OF ENTOMOLOGY.

CEREALS.

Grain crops on the whole were fairly good in all parts of the Dominion in 1907, and there were very few complaints of injury by the ordinary pests of the staple grains. In the Northwest Territories a rather extensive outbreak of the Red-backed Cutworm and some allied species, was the cause of serious loss, not only in grain crops, but in all garden vegetables and root crops. There was no complaint of injury by grasshoppers, Hessian Fly or the Greater Wheat-stem Maggot. In British Columbia the Wheat Midge reduced considerably the small crop of wheat in the fertile districts of the Fraser river valley and the adjoining districts. In Prince Edward Island the Joint-worm did much harm to wheat, and there was a noticeable occurrence, although not very severe, of Hessian Fly.

Injury to Fall Wheat by Bibo gracilis, Whr.—An interesting injury to fall wheat in Alberta was by the larvæ of a fly belonging to the family known as Spring Flies, or March Flies, so called from the fact that they occur in large numbers for a few days in spring, when they are very conspicuous from their sluggish habits. The mature flies are of about the same size, or a little larger, than the common House Fly, with slender black and hairy bodies. They fly slowly and settle in large numbers in low shrubs and other vegetation. The common species *Bibio albipennis,* Say, occurs widely throughout the country and is frequently sent in under the supposition that it may be injurious. As far as can be learnt, however, the brown tough-skinned larvæ, with short fleshy spines or processes along the sides, do little harm, although they are known occasionally to feed on the roots of grasses and grain. Kellogg states in his 'American Insects' that they 'may do serious damage, and *Bibio tristis,* Will., discovered in Kansas in 1891, appeared in great numbers in wheat fields and frightened many wheat growers.' The larvæ of the common White-winged March Fly, *Bibio albipennis,* Say, are sometimes found in very large numbers at the roots of grasses or in manure that has been ploughed down the year before and has become almost disintegrated. It is very seldom that injury of any kind is attributable to the larvæ of these flies; but in August last, Mr. D. K. Husband wrote from Carstairs, Alta., that he had sown good seed of fall wheat, from the previous year's crop, which had not been treated in any way for the prevention of smut or other fungous diseases, whereby it might have been injured, but that it failed to germinate evenly, and very little came up. On examining the field to discover the reason, he found that the central portion of most of the grain had been eaten out by the larvæ of a species of Bibio which was afterwards kindly identified for me by Mr. D. W. Coquillett, as *Bibio gracilis,* Wkr. The larvæ ate the heart out of the grain, and there were from three to seven found at each grain. In view of the importance of the fall wheat crop in the Province of Alberta, it seems well to draw attention to this insect, although it is hardly likely that it will develop into a regularly occurring or serious pest of the wheat grower.

Mr. Husband writes as follows:—

Carstairs, Alta., September 18, 1906.—'I have never previously known of such an outbreak nor have any of the older and most successful growers in this neighbourhood. The land was broken during the first two weeks in August, 100 acres. It had never been broken before, my land being a school section. I would, however, say that I find this same insect in sod which has not yet been turned, that is on each side of my ploughed field.'

From the above it would appear that this attack, notwithstanding its severity, may have merely been accidental. The sod upon the roots of which the larvæ had been feeding having been turned under, the insects attacked the roots of the young wheat because it happened to be at hand.

CUTWORMS.—There was extensive injury to fields of grain and roots in the West during 1906 by several species of cutworms with habits similar to those of the common Red-backed Cutworm, *Paragrotis ochrogaster,* Gn. A great many letters were received from all the prairie provinces, and through the kindness of Mr. Arch, Mitchell, of the Provincial Department of Agriculture at Edmonton, I was kept regularly in touch with the progress of the infestation. The attack was so severe in many districts in the foot-hill country, extending from Northern Alberta right down to the international boundary, and also in the northern country as far east as the eastern boundary of Manitoba, as to be described by many correspondents as a perfect plague. Whole fields of grain of from 30 to 50 acres were entirely cleared off, as well as vegetables in gardens. In Southern Alberta, where the cultivation of beets for sugar has been much encouraged, great losses occurred in some localities. Mr. Arch. Mitchell did excellent service by promptly distributing a circular containing suggestions towards combating the attack, and recommended the use of the poisoned bran mash, now so well known as an effective remedy against this class of destructive insects. The formula recommended was the standard remedy which has always been adopted by this Division, viz.: Half a pound of Paris green mixed with 50 pounds of bran slightly moistened with water to which a small quantity of sugar or salt has been added. Many farmers doubled the proportion of Paris green on account of the excessive injuries which they were suffering; but this practice is not to be advised, on account of the corrosive nature of the Paris green upon vegetation; and, when distributing the poisoned material, it is very difficult to scatter it through a crop, particularly of beets or other roots, without some of it falling into the heart of the young plants. The quantity recommended, one pound of Paris green in 100 pounds of bran, is ample for all purposes, and, even in the worst attacks, 100 lbs. of bran can be distributed over two or three acres. A very light sprinkling on the surface of the ground is all that is necessary. The cutworms are night-feeding insects, and this material seems to be so attractive to them, when they crawl about on the surface of the land looking for food. that they actually eat it in preference to the succulent vegetation. It has sometimes been doubted, by farmers who have not tried the poisoned bran mash for cutworms, whether it is a practical remedy for field crops on large areas. The following statement by Mr. George Harcourt, Deputy Minister of Agriculture for Alberta, should dispose of such doubts: 'Reports have been received from all parts of the province that the Paris green treatment, where used according to instructions, was entirely successful in exterminating this pest.' (Alberta Crop Report, July 5, 1906.) It must be remembered that this outbreak was a very severe one, extending over a wide area and involving very large fields of grain and other crops.

Mr. W. H. Holland of Norquay, Man., among many others, writes under date September 25: 'I have found your poisoned bran remedy a perfect discharger of cutworms.'

I am indebted to Mr. George Batho, the editor of the *Nor-West Farmer* of Winnipeg, for the following extract from his issue of June 5, 1906, relating to the use of the poisoned bran remedy on a large scale:—

'Wm. Harris, writing in the Raymond Chronicle, has this to say about the poisoning of cutworms in the beet fields of Southern Alberta:—

"Of late much has been said about the cutworms. They are certainly doing a great damage; in some fields replanting is necessary. Some may urge the cutworms as an objection to early thinning of beets, claiming that then the cutworms have but one beet to work at in a place. I have been experimenting along this line this spring and have demonstrated that the cutworms can be killed off at a very small cost. Mix dry 100 lbs. bran with from 1 to 1½ lbs. Paris green. Dampen through a sprinkling can with about 5 gallons water to the 100 lbs. bran, and mix thoroughly until each flake of bran shows the green shade.

"This mixture can either be sown by hand or through a beet drill. If by hand, take a sack made to hang about the neck, and walking between two rows and using both hands, string the bran along between the two rows on each side. In this way a 16 year old boy can apply the bran to 8 or 10 acres per day; and it can be strewn thickly enough by using 20 to 30 lbs. to the acre.

"The cost to cover five acres will be as follows: 100 lbs. bran, 80 cents; 1½ lbs. Paris green, 35 cents; labour $1. This will amount to 43 cents per acre, and if done in this way it will rid the field of cutworms. Can we afford to run the risk with this pest when one ton of beets will cover the cost of poisoning nearly 13 acres? If you do not see many dead worms, do not conclude that it has done no good. The worms come out at night, eat the bran and a great many crawl back into the ground and die; but you will be able to see many of them on top."'

There is a constant inquiry for remedies for cutworms, and, as the subject was of such enormous importance to farmers in the West last season, I repeat again the remedies for these insects which were given in Bulletin No. 52 of this Division, 'Insects Injurious to Grain and Fodder Crops, Root Crops and Vegetables.' The demand for this bulletin has been so great that it is already almost exhausted.

FOR CUTWORMS IN GRAIN.

Remedies.—When grain is found to be attacked by cutworms the fields should at once be examined to discover, if possible, what species is at work. If the cutworms are of a surface-feeding kind, like the Red-backed Cutworm, they may frequently be controlled with comparative ease by scattering poisoned bran lightly through the grain, near the spots where the caterpillars are most numerous, or ahead of them, when they are so numerous as to have assumed the marching habit. If land is systematically kept clear of weeds in autumn, there will seldom be trouble from cutworms in the crop of the following year. Prairie or sod land which is to be broken for seeding the next year should be fed off as late as possible or mowed before breaking. In this way the female moths will not be attracted to the tall vegetation on such lands when laying their eggs.

FOR CUTWORMS IN GENERAL CROPS.

Remedies.—(1.) Clean Farming.—The keeping down of all weeds and the burning up of all haulms, stems of reaped crops and refuse, as early as possible in the autumn after crops are reaped, will destroy many eggs and prevent the deposition of others by presenting no suitable place for the moths to lay their eggs. The eggs are laid in autumn or spring, and such places are chosen by the moths as where there will be an abundance of food for the young caterpillars on hatching.

(2.) Traps.—Large numbers may be destroyed by placing between the rows of an infested crop, or at short distances apart on infested land, bundles of any succulent weed or other vegetation which has been previously poisoned by dipping it, after tying in bundles, into a strong mixture of Paris green, 1 oz. in a pail of water. The cutworms eat the poisoned plants, then bury themselves and die. In hot, dry weather these bundles should be put out after sundown, and a shingle may be placed on each to keep it from fading.

(3.) Banding and wrapping:—

(*a*) It will be found to well repay the trouble and expense to place a band of tin around each cabbage or other plant at the time of setting out. These may very easily be made by taking pieces of tin 6 inches long and 2½ inches wide, and bending them around a spade or broom handle so as to form short tubes. In placing them around a plant the two ends can be sprung apart to admit the plant, and then the tube should be pressed about half an inch into the ground. I have found this a useful means of disposing of empty tomato and other cans. To prepare these easily they need only be thrown into a bonfire, when the tops and bottoms fall off and the sides become unsoldered. The central piece of tin can then be cut down the centre with a pair of shears and forms two tubes.

(*b*) Wrapping a piece of paper round the stems of plants when setting them out will also save a great many.

Hand-picking or digging out the cutworm whenever a plant is seen to be cut off should, of course, always be practised.

(4.) Poisoned Bran Mash.—The most remarkably effective remedy against cutworms is the poisoned bran mash which has lately come into such wide use. This is made by mixing half a pound of Paris green with fifty pounds of slightly moistened bran. In making this, it is best first to dampen some of the bran slightly with water containing a little sugar or salt half a pound to a gallon. After mixing thoroughly, add the Paris green by dusting it on the surface and stirring all the time. We have found that when Paris green is added to perfectly dry bran, owing to its weight, it will sink at once to the bottom when stirred, in the same way that it does in water. Half a pound of Paris green is enough to poison fifty pounds of bran, although double this amount may be used. If the mixture is too wet, more dry bran should be stirred in until the mixture will crumble easily and run through the fingers without adhering.

When required for garden use, all that is necessary is to sprinkle a little of the poisoned mixture by hand around such plants as are liable to attack. When crops are planted in drills or in rows, a convenient way is to make the mixture rather dry and then distribute it by means of a Planet Jr., or other wheel seeder. In field practice, among such close growing crops as standing grain, which are sometimes injured by the Red-backed Cutworm, the poisoned bran remedy is also serviceable. The mixture can be distributed by means of a paddle or shingle and can be thrown easily to a distance of twenty feet. When distributed in this way, there is much less danger of chickens and birds picking it up than if it is placed in lumps.

The question of danger from the use of this poisoned bait is one which must be considered. It is frequently inquired about by correspondents, and some instances of the poisoning of poultry where it has been used, seemed to be justly attributable to their having eaten some of it. As a rule, there is little danger from this cause. The quantity used is so small that it is not noticed by poultry; and then, in gardens, poultry do so much harm to plants that they should never be admitted at the time of year when cutworms occur injuriously and only at special times of the year when there are no crops to injure. If, however, there should be a bad infestation by cutworms and there is no means of barring out or driving away the chickens, the owner of the crops must decide whether he will lose his crop or take special means of protecting his chickens. The experience of a great many people who have used this remedy without taking any special precautions, is that injury to domestic animals is extremely rare; and, although I have been on the watch for any trouble of this sort for many years, I do not know of a single instance when poultry have been poisoned, without doubt, by eating poisoned bran put out for cutworms. However, there will be many occasions when plants in gardens may be protected by putting out the poisoned bran in small heaps and then covering these up with a piece of shingle or some other covering, so that the material cannot be got at by stray chickens and other poultry.

It has also been asked whether there is any danger of plants absorbing Paris green from this mixture when placed near their roots. In reply to this, it is only necessary to point out that Paris green is practically insoluble and therefore cannot be absorbed by the plant. The only danger in its use is from its corrosive effects on vegetation, if thrown accidentally on to foliage where it can remain for some time.

WESTERN WHEAT-STEM SAWFLY (*Cephus occidentalis,* Riley and Marlatt).—From time to time specimens of this sawfly have been reared from the stubble of wheat fields in Manitoba and the Northwest provinces; but the attack has never been of a serious nature, and it was thought that probably the insect was naturally a depredator on some of the native western grasses. The matter has been investigated very carefully by Mr. Norman Criddle, of Aweme, Manitoba, and he has found that two or three native grasses are regularly attacked, even when growing in close proximity to fields of grain. He writes: 'The Western Wheat-stem Sawfly was enormously abundant this year. I think fully three-quarters of the stems of the bunch grass which we have been calling *Agropyrum caninum,* contained the larvæ. Wheat and rye were also infested to a moderate extent round the edges of the fields next to the prairie. Fully 10 per cent of the cultivated Western Rye grass, *Agropyrum tenerum,* had also larvæ in the stems, which of course prevented the seed from forming. During the winter and early spring the larvæ can be found about an inch below the ground in the stems near the root.'

The remedies which suggest themselves for this insect are the burning over of stubble in autumn or early spring, and the mowing of the coarse-stemmed grasses round the edges of wheat fields.

ROOTS AND VEGETABLES.

There has been the usual loss in gardens and in field root crops from the well known pests; but careful clean gardening and prompt attention have, as is always the case, prevented extensive injury. In one or two instances, as the cutworms in the West, which attacked not only field crops, but spread into every garden in the infested districts, the Sugar Beet Webworm in Southern Alberta, and an outbreak of the Spotted Cutworm, *Noctua c-nigrum,* L., at Leeds, Ont., it required much effort to hold the devastating swarms in check.

The COLORADO POTATO BEETLE was more than usually abundant in Manitoba.

Aweme, Man., November 26.—'The Colorado Potato Beetle was plentiful everywhere and did a great deal of damage to the foliage of potatoes. I noticed, however, that it was in much larger numbers on the plants of the Three-flowered Nightshade, *Solanum triflorum.*'—N. CRIDDLE.

Norquay, Man., September 25.—'The Colorado Beetle has been worse than ever before; it appeared in great numbers and very early on my early potatoes, which they would have destroyed utterly, if I had not sprayed them. They did not attack the main crop, which was put in later, until quite late in the season, and then only in patches. This fact was also noticed by several others in the neighbourhood. The insect was so general all over the province that the supply of Paris green was cleared out to the last ounce. The newspapers spoke of this beetle as a new thing in Manitoba; but I saw it here in 1889, and about 1893 a patch of potatoes planted in a small clearing in the bush about a mile from me was entirely devoured. Since that time I have been using Paris green every year until last year, when I did not see a single beetle.'—W. H. HOLLAND.

Several other correspondents in Manitoba spoke of the destruction by the Colorado Potato Beetle, and an effort was made to secure combined action in controlling the insect. In the older provinces there was the usual occurrence of this insect, and, where the plants were not sprayed, there was much loss. In Prince Edward Island the loss was reported as unusually large and the beetles as more numerous than for many years. The Rev. Father Burke states that prompt application of the ordinary remedy, Paris green invariably gave good results. The Colorado Potato Beetle and the Potato Rot, a fungous disease, are now of such regular occurrence throughout all the eastern parts of Canada that spraying the vines regularly with the poisoned Bordeaux mixture by means of the best spraying implements obtainable, should be recognized as a regular part of the practice of growing potatoes commercially, as well as in gardens, even of only limited extent. The cost and labour are comparatively small, but the profits are certain. The formula which is recommended for potatoes, is:—

Copper sulphate (bluestone)..	6 lbs.
Lime (unslaked)..	4 "
Water..	40 gals.
Paris green..	8 ozs.

If preferred, 3 lbs. of arsenate of lead may be used instead of the 8 ozs. of Paris green. This material is supplied in the market in the form of a thick paste. It is necessary that it should be thoroughly thinned with some water before putting into the spraying mixture. This is easily done; but, if the paste is put into the mixture without first dissolving it, it will not mix thoroughly. One of the advantages of arsenate of lead is that it remains on the foliage much longer than Paris green, and it is well known that it is not so destructive to the foliage.

In addition to the Colorado Potato Beetle, extensive injury is sometimes done by a small flea-beetle known as the Cucumber Flea-beetle, *Epitrix cucumeris*, Harr. This beetle, strange to say, is difficult to control with the ordinary applications of Paris green; but, if the poison is mixed with Bordeaux mixture, it is very effective, and it, like all other foliage eating insects, can be prevented from injuring the crop.

Enemies.—A subject which is always of much interest is the detection of the parasitic and predaceous enemies of any common injurious insect. During the past year specimens of the useful and beautiful little Carab, *Lebia grandis*, Hentz, were observed with interest and in some numbers, by Mr. Richard Gibson, of Delaware, Ont. He noticed them on several occasions attacking the larvæ of the Potato Beetle and destroying them. The Rev. Robert Hamilton, of Grenville, Que., also sent me specimens of the predaceous bug, *Podisus spinosus*, Dall., which he had found preying on the larvæ of the Colorado Potato Beetle. He had seen a great many of these larvæ lying dead among his potatoes and was induced to look for the cause, when he found an unusual number of the predaceous bugs. There are a great many parasites of this regular enemy of the potato grower; but, unfortunately, they are never abundant enough to affect appreciably its numbers, and spraying potatoes will probably always be every year a necessary part of the successful cultivation of that important crop.

THE POTATO-LEAF APHIS, *Nectarophora solanifolii*, Ashm.—An occasional but destructive enemy of the potato is the above named plant-louse, which in the spring of 1906 was very abundant at Ottawa. The potato fields in the month of June were much infested, and the plants were stunted by the attacks of the insects, thus aggravating to a marked degree the effects of the protracted drought which prevailed in the Ottawa valley. About the beginning of July the insects suddenly disappeared, and in favourable localities the plants to some extent outgrew the injury. The life habits of this species of aphis are as yet unknown; but it is probable that at that time the species migrates to some other food-plant, as is known to be the case with other species. Although some kinds of ladybird beetles were observed on the plants, it was considered that they were not in sufficient numbers to account for the sudden diminution in the numbers of the plant-louse. On a small scale, experiments in spraying with the ordinary insecticides for this class of insects were quite effective. Whale-oil soap, 1 lb. in 5 gallons of water, and kerosene emulsion made with Tak-a-Nap soap gave the best results.

No reports of injury were received in 1906 from Nova Scotia, where considerable injury was done in 1904.

THE SMALL WHITE CABBAGE BUTTERFLY, *Pontia rapæ*, L.—This well-known enemy of the cabbage was remarkably abundant and destructive in Manitoba during the summer of 1906.

Aweme, Man., September 20.—'The larvæ of *Pontia rapæ* were more abundant this year in our district than I have ever known them to be, and, as a result, in those districts where the use of pyrethrum insect powder was not known, cabbages were seriously and in some places wholly destroyed. Here a couple of dustings of the powder a week apart, mixed according to your directions, completely exterminated the caterpillars, so that no further damage was done, and we had a good crop. Turnips wild mustard, wild radish, and even the notorious Stinkweed, were also attacked, as well as, I suppose, many other cruciferous plants which I did not notice.'—N. CRIDDLE.

Norquay, Man., September 25.—'The Cabbage Butterfly has descended on us as a scourge; every cabbage patch I know has been destroyed, also mignonette in the flower garden. Later they attacked Swede turnips rather savagely. I note your remedy (insect powder and flour) which I will have ready for them next year.'—W. H. HOLLAND.

Macgregor, Man., October 25.—'The White Cabbage Butterfly appeared suddenly this year in immense numbers, and the caterpillars entirely destroyed the cabbage crop. There were but four cabbages at our local show on the 3rd instant; two of these were completely riddled by the caterpillars, and the other two, although not so bad, were injured to some extent. I saw no tickets attached to any of them. What I would like to know, is: Are these butterflies likely to turn up again next season, or are they only occasional visitors? They are distinct from the cabbage butterfly that is in Ireland and they seem to be harder to deal with, as the grubs get into the centre of the cabbage, while those in Ireland live on the outer leaves.'—T. ROWAN.

Cypress River, Man., March, 1907.—'Last year the White Cabbage Butterflies were so numerous as to be quite a plague in this part of Manitoba, and no one here had a cabbage for winter use. The whole cabbage was like a skeleton. I tried quick lime (that was a specific in the old country), but it was of no avail here; and then I tried salt, but they seemed to like that all the more, and then I tried ashes.'—JOHN MARTEN, SR.

The caterpillars of the Small White Cabbage Butterfly, commonly known as Cabbage Worms, are, when full grown, about an inch long, of a velvety green colour, with a broken yellow line along each side and an unbroken one down the middle of of the back. The eggs are laid on the leaves on any part of the plant and on both sides of the leaves. The young caterpillars hatch after about a week and at once feed on the soft tissues close around the egg from which they have emerged. As they grow larger, they bore into the heads of the cabbage and do a large amount of injury, compared with their size. Being of the same green colour as the leaves, they are difficult to detect and may be in large numbers upon the plants without being noticed, except for their injuries. After feeding for about a fortnight .the chrysalis condition is assumed, and in about a month after the eggs are laid the butterflies appear. There are two regular broods during the growing season and, besides this, sometimes a late supplementary brood of which the caterpillars are found as late as November. Cruciferous plants of nearly all kinds are attacked by this insect, as well as plants belonging to the Caper and Mignonette families, which are closely allied to the Cruciferæ.

This insect, which has now spread right across the Dominion and is every year the cause of enormous losses, not only in crops of cabbages, but also in turnips, swedes, and rape, is a comparatively recent importation from Europe. The first records of its occurrence in America were about 1860, when it was observed near Quebec; and it is supposed that it was brought across the Atlantic on some of the ships running into Quebec from European ports.

Remedy.—Although every year responsible for a great deal of loss to farmers and gardeners, this insect is one of the easiest pests to control. There are many remedies which are more or less exploited; but the one which has given us most satisfaction at Ottawa and has certainly proved very satisfactory to every one who has tried it, is to dust the plants, as soon as the caterpillars are noticed, with a mixture of 1 pound of pyrethrum insect powder in 4 pounds of cheap flour, or any other perfectly dry powder. Mix the whole together and keep it in a tightly closed canister or jar for 24 hours. The powder is then ready for use and may be dusted over the cabbages either with a cheese-cloth bag tapped lightly with a slender stick, or from one of the various insect guns, or dusters, now sold by seedsmen. The advantage of this remedy over many others which are recommended is that, although insect powder is so deadly to the caterpillars and most insects, it is quite harmless to human beings and the higher animals.

The rather prevalent custom of using Paris green and other arsenical poisons on cabbages and other vegetables, must be condemned as being very dangerous without any commensurate advantage.

It is claimed, as the heading up of cabbages is a development from the central axis and not an infolding of the leaves, that there is no danger of the Paris green or other poison being inclosed in the cabbage head; but these cabbage worms and several other kinds of caterpillars which feed upon the cabbage, bore holes into the heads, thus giving an opportunity for these poisons to be washed into them, and, as a matter of fact, some actual instances of poisoning in this way are recorded. Two or at most three applications of the insect powder have always been found enough on our grounds at Ottawa to clear cabbages and cauliflowers thoroughly.

THE SPINED RUSTIC *Barathra curialis,* Smith.—In the report of this Division for 1905, pp. 179-180, considerable space was given to a notice of a remarkable outbreak of a usually rare noctuid moth under the name of *Barathra occidentata,* Grote. During the season of 1906 a few specimens of the moth were taken at night in various parts of the country within the range where the moths and caterpillars had been observed the previous season, but there was no widespread occurrence similar to that of 1905. One instance of noticeable injury was reported to me by Dr. C. A. Hamilton, of Mahone Bay, N.S. This was in the garden of a neighbour, where fully half of a large patch of cabbage was destroyed by the caterpillars. Dr. Hamilton had none of the insects in his own garden and heard of no other growers who suffered. There was, however, an occurrence recorded by the United States Bureau of Entomology in the State of Vermont.

As stated above, the insect was treated of in my 1905 report under the name of *Barathra occidentata,* Grt.; but I have since learnt from Sir George Hampson, of the British Museum, that the species is really *Barathra curialis,* Smith; and this identification has been confirmed by Dr. J. B. Smith, the describer of the species, and also by Dr. H. G. Dyar.

A NEW CABBAGE PEST, *Barynotus schœnherri,* Zett.—To the already large list of insects which attack the cabbage, another has to be added, in the large gray Otiorhyncid beetle above named, as is shown by the following letter:—

Lawrencetown, N.S., July 7.—'I send specimens of a beetle that is doing a great deal of damage to the cabbage crop in this locality. They attack the young cabbages and cauliflowers when set out in the field, stripping the leaf right down to the ground. I shall be glad if you can give me the name and a remedy, if one is known to you.'—COLIN HILTZ.

This beetle is interesting from a scientific standpoint on account of its occurrence in Nova Scotia. It is a European species, but was detected in Nova Scotia on the sea coast some years ago by Mr. W. H. Harrington, in company with some other European insects such as *Otiorhynchus rugifrons,* Gyll., *O. sulcatus,* Fab., and *Sciaphilus muricatus,* Fab. These are all common insects of Northern Europe. All three of the last named have been found in Newfoundland, as well as on the coast of Nova Scotia; but no complaint has ever been made of injury by *O. rugifrons*, nor previously of depredations by *Barynotus schœnherri*. *Otiorhynchus sulcatus*, on the other hand, has on several occasions been reported as a rather troublesome pest in old beds of strawberries. In Europe it has been called the Black Vine Weevil, from the frequency of its injuries to the grape vine.

Remedy.—Soon after the injury to cabbages was reported as above by Mr. Hiltz, the beetles disappeared. The remedies suggested were based on the structure of the beetle. Although provided with well developed wing cases, these insects, like most of the others belonging to the same natural family, have no true wings; so they can only gain access to their food plant by crawling. Preventive remedies were therefore recommended. Watering the plants with a kerosene emulsion, it was thought, might keep the beetles away from plants so protected. The surrounding of the plants with tin bands, as is done for cutworms, would also doubtless be effective, and perhaps a band of paper might answer for the same purpose. It was further suggested that as this insect is nocturnal in habit, traps in the shape of shingles or other easily handled shelters might be placed about the field for the beetles to hide under during the day, from which they might be collected in the morning and killed by dropping them into some receptacle containing water on the top of which some coal oil had been poured. There was no opportunity for trying these remedies; but they may be remembered at any future time, should the insect appear again in destructive numbers.

This weevil is easily recognized by its thick-set oval shape, about ⅜ of an inch in length, its uniform grayish-brown colour and its short thick beak. Very little is known about its food habits; but it is probable that it has other food plants besides members of the Mustard family, and, if this should prove to be the case, some of these might be used as traps by poisoning them with Paris green and, after tying them in bundles, distributing them about the field at short intervals.

Asparagus Beetles, *Crioceris asparagi*, L., and *C. 12-punctata*, L.—The two species of Asparagus beetles are now a regularly occurring trouble to asparagus growers in the Lake Erie and Lake Ontario counties. These insects are slender beetles about a quarter of an inch in length and are very unlike in appearance and habits. The Common Asparagus Beetle is conspicuously marked with six yellowish white blotches on the wing-cases, which are of a metallic blue-black colour. The neck and the borders of the wing cases are reddish. The 12-spotted Asparagus Beetle is of a bright reddish orange with 12 round black spots on the wing covers. The larvæ of the first are of a dull olive green colour and slug-like in appearance. The eggs are laid early in spring by the over-wintering beetles and are of a greenish black colour. They are frequently laid in large numbers upon the young shoots rendering these unsightly for the market. The grubs feed upon the green growth and are produced throughout the season. The grubs of the 12-spotted species are similar in shape to those of the Common Asparagus Beetle, but are of a dirty yellowish colour and feed only inside the berries of the plant. The asparagus beetles made their first appearance in Canada, in the Niagara peninsula in 1898, and have not only persisted there, but have gradually spread in every direction since that date. They appeared in Toronto three or four years ago and are now the cause of much anxiety to asparagus growers; nevertheless, the spread, on the whole, is far less extensive that it was at first feared it might be. During the past season, however, there was a wide extension. No mention has been made of injury by the beetles to any distance east of Toronto; but on the 20th September last, a few specimens of the larvæ of the Common Asparagus Beetle were found at Ottawa upon an isolated bed of asparagus which had been planted for about twenty years and to which no new plants had been brought in from outside. The beetles, therefore, must have flown to it from some distance. These larvæ buried soon after they were found, and nearly a month later the perfect beetles were found in the breeding jar. The two species of Asparagus Beetles seem to have spread in company. The common species, as a rule, in the United States preceded to some extent the 12-spotted form; but in Western Ontario this rule seems to have been reversed in most instances. So far, however, the 12-spotted form has not appeared at Ottawa.

Remedies.—(1.) Dusting with lime. The most effective remedy is probably the destruction of the larvæ by dusting the plants systematically every three or four days with fresh air-slaked lime, which kills all those with which it comes in contact. (2.) Poisoning. Active poisons, as a mixture of Paris green and flour, or, better, Paris green mixed with the lime mentioned above, and dusted through the plants, will kill not only by contact with the larvæ, but will destroy both them and the perfect beetles which eat the poisoned foliage. (4.) Beating. Beetles and larvæ may be beaten from the old plants into nets or broad pans containing water and coal oil. Nets made especially for the purpose are most convenient. The larvæ may also be brushed off the plants with a stick, and, if this is done in the middle of a hot day, it is claimed that few will be able to get back again. (5.) Young chickens and ducks, when available, are very useful in eating the beetles when they first appear in spring.

As the perfect beetles appear early in spring and feed and lay their eggs in large numbers upon the young shoots, early cutting not only of the heads when fit for the market, but also of the small shoots which are of no use for that purpose, should be practised. In this way many of the larvæ are prevented from hatching, and the numbers of the pest to that extent reduced. When the 12-spotted Asparagus Beetle is known to be present, the berry-bearing plants should be cut off and burnt before the berries turn red so as to destroy the contained larvæ.

THE RED TURNIP BEETLE, *Entomoscelis adonidis,* Fab.—This showy scarlet beetle which is two-thirds the size of the Colorado Potato Beetle, and has three black stripes down its back, is now becoming well-known to the settlers on the prairies and in British Columbia. As the prairies are more settled up and the weeds belonging to the Mustard family become scarcer, there is every probability that the depredations of this insect upon cultivated crops will become more noticeable. Specimens were sent in last season from several places in Manitoba, the Northwest and the interior of British Columbia. As a remedy, dusting the plants with Paris green and flour (1 to 50) answered well. A rather severe outbreak at Fort Ellice, Man., is recorded by Mr. Louis Worms, as follows:—

'I reported to you in the spring of 1904 the depredations of the previous year in my garden at St. Lazare by the Red Turnip Beetle. In 1904 my garden was inundated in spring, and I only finished sowing my seeds in the beginning of June. During that year I did not notice any appreciable injury done by insects. It was quite otherwise in 1905. On the same piece of land which had been used as a garden for the two preceding years, I put out in the beginning of June, and in excellent condition, 450 fine plants of different varieties of cabbages. They took well, but I soon noticed that the leaves were much cut up and covered with beetles. The strongest plants resisted and in the end gave me a poor crop of about 50 imperfect cabbages. A bed of kohl-rabi was likewise checked in its growth by the same insect. Another field of white turnips about a quarter of a mile off were also much injured, and I was able toward the end of August to count as many as 15 or 20 beetles on a single turnip plant. I cannot explain where these insects could have come from in such numbers. Many of my neighbours also had their gardens infested, and one of them sowed his Swede turnips three times; another was equally unfortunate with me. How do these insects get to the plants?'

It was explained to Mr. Worms that the Red Turnip Beetle, like many others of the family to which it belongs, has well formed wings beneath the hard wing cases, by means of which it can fly long distances from place to place. The species seems to be more attracted by its native food plants, the Gray Tansy-mustard and the Prairie

Wallflowers, than by cultivated crops, but on many occasions great injury has been done to crops of turnips and cabbages of all kinds.

THE RED-EDGED LEAF-HOPPER, *Oncometopia lateralis*, Fab.—As the prairie lands of the West are gradually brought under cultivation, it must be expected that some of the native insects will occasionally turn their attention to cultivated crops and also that some of them may become regular enemies of the farmer or tree-grower.

In May last, specimens of the above-named leaf-hopper were sent in by Mr. J. A. Mitchell, of Pakan, Alberta, with the report that they were occurring in destructive numbers upon his young seedlings of the Ash-leaved Maple (*Acer Negundo*). These were insects which had passed the winter in the mature condition. In August Mr. S. S. Galbraith sent several specimens of a new brood which he had found in great numbers on his vegetables. They were especially thick on the stems of parsnips, beets, &c., and it was noticed that they discharged frequently drops of a colourless liquid, evidently the sap which they had sucked from the plants. No particular damage was noticed and the insects disappeared suddenly after a heavy rain storm. Should these leaf-hoppers ever occur in sufficient numbers to become injurious, contact insecticides such as whale-oil soap or kerosene emulsion should be sprayed over the infested plants.

THE HOP FLEA-BEETLE, *Psylliodes punctulata*, Melsh.—For several years complaints of extensive injury to the hop plants in the Fraser river valley of British Columbia by a small black flea-beetle have been reported. Specimens have been received from Mr. John Wilson, the manager of large hop-yards belonging to Sir Arthur Stepney. Mr. Wilson writes on September 14 last:—

Agassiz, B.C.—'I am sending you a package of hops, just as I pulled them from the vines. I am now all through with my hop picking, and we had a very light crop—only 42 bales where we ought to have had 240. This shortage is due to the work of the flea-beetle. At the present price of hops, I consider that Sir Arthur Stepney will be a loser of from $15,000 to $20,000, so, you will see what a serious matter this is.'

Mr. Wilson tried many experiments with insecticides, but with little effect; and I must acknowledge that I cannot understand his failures, unless perhaps his spraying apparatus may have been inadequate. The remedy recommended was the ordinary poisoned Bordeaux mixture, made according to the 4-4-40 formula, with from 4 to 8 ounces of Paris green to the 40 gallons. He also tried the Bordeaux mixture poisoned with 4 pounds of arsenate of lead to the same amount of mixture. Either of these applications should certainly kill this insect on hops, as they have been found to do on rhubarb in the Northwest and Manitoba.

Mr. Thomas Cunningham, the Provincial Inspector of Fruit Pests of British Columbia, visited the infested hop yards and helped Mr. Wilson in his efforts at controlling the beetle. He writes to me in December last:—

Vancouver, B.C.—'I am free to confess that very litte impression was made by arsenical spraying. Dusting seemed to do better. I have a Leggett powder gun which does excellent dusting; but the trouble is, as soon as the dust or spray strikes the vines, the fleas hop off on to the ground. In all my experience with insects, I have never seen anything that will approach the fleas in resistance to all kinds of treatment.'

Mr. H. Hulburt, of Sardis, B.C., has also had experience with the Hop Flea-beetle, and has destroyed large numbers by catching them on tarred sheets as they flew from the vines after being disturbed.

The Hop Flea-beetle is a native insect, and there are two broods in the year, the first appearing in June and the second in August. It is quite different from the flea-beetles which are found on hops in England. Up to the present time little progress has been made towards getting a practical remedy; but steps have been taken to carry out further experiments next season, which it is hoped, will be more satisfactory.

FRUIT CROPS.

The fruit crops of the Dominion were very irregular, variable both in quality and in quantity according to the local conditions which prevailed. The apple crop was the one most affected by injurious insects. This important crop in the Maritime Provinces was poorer than usual. Father Burke speaks of the Codling Moth as very abundant in Prince Edward Island. In Western Ontario the ravages of the Codling Moth were extremely severe, and probably owing to the short plum crop the Plum Curculio did more harm to apples than in any year of which we have statistics. Plums were very short in quantity everywhere, except in British Columbia, owing to inclement weather which affected the buds and blossoms. In Ontario, sweet cherries were much reduced by the winter-killing of the buds and by the falling of the fruit after setting. Sour cherries gave an excellent crop in Ontario, quite free from insect injury. Small fruits were abundant in all provinces with the exception of strawberries, which were very much winter-killed in Ontario and Quebec, owing to the lack of snow and the mild changeable winter with one or two snaps of intense cold.

The Codling Moth, *Carpocapsa pomonella,* L.—Mr. George E. Fisher, of Freeman, Ont., writes: 'The remarkable increase of the San José Scale and Fall Webworm and the unprecedented injury by the Codling Worm upon the apple crop were the most conspicuous features of the past season.' And Mr. A. McNeill, in his September, 1906, Fruit Crop Report, writes: 'The marked feature of insects for this month is the pronounced appearance of the work of the Codling Moth. No doubt the crop of this year will be more affected by Codling Moth than any of the last four or five years. The Fall Webworm is the only other insect of which serious complaint is now made.' Mr. Fisher also, in his report as Director of the Entomological Society of Ontario, for the Hamilton district, states: 'There is no insect so widely distributed and so destructive to the fruit crop of the country as the Codling Moth, which causes the loss of many thousands of dollars annually. 1906 was pre-eminently a Codling Moth year, the worst on record. In many apple orchards one-half of the crop was wormy, and in some the proportion of injury was even greater. How to lessen the ravages of the Codling Worm is an intricate problem for apple and pear growers, who resort to various means. The most popular remedies are spraying with arsenites, bandaging, and keeping hogs and sheep in the orchard. Spraying will reduce the first brood. Bandages should be applied early in July after the rough bark has been scraped from the trunk and large limbs. If at intervals of ten days these bandages be removed and, after the worms have been destroyed, the bands are put back on the trees, continuing the work throughout the season until the crop is harvested, the evil will be materially lessened.'

Remedies.—Great stress has been laid in the past on the importance of spraying apple orchards while the calyx remains open and before the fruit turns down owing to its increasing weight. I think that possibly this feature of the case has been somewhat overdrawn. It is true that a large proportion of the young larvæ gain access to the apple through the calyx end; but the eggs are laid mostly on the sides of the apple and also in large numbers on the foliage. The young larvæ, on hatching, feed on the foliage to some extent, as was observed by the late Mr. Simpson of the United States Department of Agriculture, who published a very complete treatise on his experiments with the Codling Moth. If spraying has not been done before the apples turn down, there is still ample time to do much good for some time afterwards, as the calyx lobes do not close sufficiently to exclude the young larvæ for some time after that. I have found freshly laid eggs on crab apples that were half an inch in diameter, and good results followed from spraying the orchard in which they were growing, even at that time. The remedies for the Codling Moth must be devised in accordance with its life history. Those founded on our Ottawa observations and experiments, are given below and, where applied regularly year after year, have given perfectly satisfactory results. As in Canada east of a point about Toronto there is only one regular annual brood of the Codling Moth, the insect can there be controlled almost entirely with careful and regular spraying with the poisoned Bordeaux mixture. West of Toronto there are two broods, the second of which is by far the more destructive and difficult to cope with. It has been found that in this latter district it is necessary to supplement the spring spraying by wrapping the trees with loose bands of burlap or some other material which will serve as a refuge in which the caterpillars will spin their cocoons, these to be removed regularly and the caterpillars killed at short intervals after the middle of July, when the caterpillars begin to spin up. Care must be taken to scrape or brush the bark beneath these bands with a stiff brush or some other implement so as to remove all of the cocoons which are frequently sunk into the substance of the bark by the caterpillars gnawing away the surface. The insects in the bands may be killed by dropping the latter into boiling water or by crushing the cocoons. The poisoned Bordeaux mixture made with 4 lbs. of fresh lime, 4 lbs. of bluestone and 4 ounces of Paris green (or instead of the 4 ozs. of Paris green, 3 lbs. of Arsenate of lead) in 40 gallons of water, we have found to be a sure remedy against the Codling Moth, if applied every year. Three applications are necessary, the first one applied a week after the blossoms have fallen, and the others afterwards at intervals of fifteen days. In orchards which have not been previously treated for a year or two, four sprayings should be given.

The Codling Moth, which is such a destructive enemy of the apple in almost every locality where that favourite fruit can be grown, has in the past for some remarkable and unexplainable reason, never appeared in British Columbian orchards. There can be no doubt about infested fruit having been taken into the province very frequently; for I have heard of injured apples being found on the tables of the railway dining cars, and in addition many carloads of apples from Eastern Canada and the United States, where the insect is abundant, have of recent years been imported into British Columbia. It is quite impossible that even the most careful inspection could detect every infested apple; but yet the fact remained that, up to a year or two ago, there was no record of the insect having been found in the Pacific province. During the summer of 1906 specimens of the moth that had been reared from larvæ taken in the open on trees growing at Kamloops and at Kaslo, were sent to me for identification. The first specimens came from Mr. J. W. Cockle, of Kaslo, and were from cocoons which he had found in 1905 on the trunk of an apple tree growing in a garden within the limits of the town of Kaslo. Some other cocoons were found at the same time, and the work of the insect has also been further observed during the past summer. The Kamloops ocurrence is referred to by the finder in the following letter:—

Kamloops, B.C., June 6, 1906.—'For the past two or three years the apple crop in the gardens of this city has been almost destroyed by a worm which in appearance and general characteristics closely resembles the Codling Moth, yet I do not think it is quite identical with that moth as it is found in Eastern Canada. I am forwarding to your address two living specimens of the moth.'—E. STUART WOOD.

The two specimens sent by Mr. Wood were, like those sent by Mr. Cockle, undoubted specimens of the Codling Moth and quite identical with the form so common in the East. Fortunately for the fruit growers of British Columbia, the energetic Inspector of Fruit Pests, Mr. Thomas Cunningham, is carrying on a vigorous campaign in persuading every one who grows fruit, of the great advantage of spraying their trees persistently. By spraying, not only can the Codling Moth be controlled, but also many other pests of the orchard.

THE PLUM CURCULIO, *Conotrachelus nenuphar*, Herbst.—Plums were a very short crop over the whole of Eastern Canada in 1906. In consequence of this, there were more complaints of injury to apples, cherries, and peaches, by the Curculio than has been the case for many years. The greatest injury was done to the apple crop, and there were several instances of severe attack in the provinces of Quebec and Ontario. One of the worst was at Eglinton, Ont., near Toronto, on the grounds of Mr. John

Annable, who sent me during the first three weeks of July, some consignments of apples which had fallen from his trees. These apples each contained from one to five of the grubs of the Plum Curculio. The whole crop of this orchard was ruined. The loss from this insect was also considerable in the apple orchards of the Eastern Townships of the province of Quebec. When plums and apples are attacked by the Plum Curculio, the fruit drops freely, when about half-grown or less. Cherries hang on the trees much longer. From the fact that many young apples fall naturally during June, the injuries by the Curculio are frequently overlooked. Mr. Annable states that when he was sending off the injured fruit at my request for examination, his neighbours made great fun of him, telling him that there was nothing the matter with them and that it was natural for the young apples to fall off at that time of year.

Remedy.—In our Canadian experience we have always found that spraying with arsenical poisons was by far the best remedy for the Plum Curculio, and it has been a surprise to me that this method is not more advised and practised in the United States. The jarring method is by far too expensive in labour for adoption here, when the results of the two practices are compared. The effects of spraying for Curculio on plums are all that a paying remedy calls for. On apples, the effects seem to be less marked; but, even on that crop, there is a decided advantage far in excess of the cost.

Plums are grown in large quantities in the Niagara district and all of the most successful growers have adopted spraying with arsenites as the standard remedy for the Curculio.

Wolfville, N.S.—'I have known the "Little Turk" from boyhood and used to follow him up with mallet and sheet. Then I trained a hen and a flock of chicks to follow and pick up the beetles as they fell. This was far easier and quite as effectual. The chicks used to think it grand fun. Since spraying has become general, the damage to the plum crop by Curculio has not been so great.'—R. W. STARR.

Homer, Ont.—'With regard to spraying for Plum Curculio, I spray about four days after the blossoms drop. If I leave the plums till they are about the size of beans, and the beetles have begun to cut or sting them, then no amount of poison will save the crop. I find arsenate of lead away ahead of Paris green, because it does not burn the leaves and does not wash off so easily with the rain. Last year I sprayed all my plum orchards with arsenate of lead and really found none of the fruit cut by the first hatching of the curculio.'—F. G. STEWART.

St. Catharines, Ont.—'I use 3 ozs. of Paris green and 5 lbs. of lime to a barrel of water for the first spraying. For the second application, 2 ozs. of Paris green and 5 lbs. of lime. If the spraying is done carefully the first time, I find it is not necessary to spray twice in some seasons. The spraying should be done as soon as the blossoms drop.'—ALEX. GLASS.

St. Catharines, Ont.—'A thorough spraying with Bordeaux mixture, I have found to be the best remedy for Curculio. Generally speaking, plum trees load very heavily and the loss from Curculio after spraying is a help in thinning out the crop.—E. MCARDLE.

St. Catharines, Ont.—'I have never used any mixture for Curculio but the ordinary 4-4-40 Bordeaux mixture with 4 ozs. of Paris green. During the last five seasons I have not missed one crop of plums, and I attribute this entirely to spraying. I think it absolutely useless to attempt to grow plums in this section without spraying, since, even if the fruit escapes the Curculio, the "Shot-hole" fungus will destroy the foliage so early that the next season's crop is discounted. In fact, I consider spraying more important, if anything, than cultivation to ensure a crop of plums.'—R. F. ROBINSON.

The above are a very few quotations from many decided letters on this subject; and, although a few of my correspondents still adhere to the old-fashioned remedy of jarring, spraying is so effective that these are becoming fewer every year. The remedies recommended by this Division are: (1.) Spraying the trees with the 4-4-40 poisoned Bordeaux mixture very early in the season, directly the fruit is set. This destroys the beetles, which for some time feed upon the buds and opening leaves of plum trees. The second spraying, with poisoned Bordeaux mixture, should be made when the plums are about as large as peas. This will coat the young fruit so that the beetles are destroyed when they feed on the fruit or cut the crescents for egg-laying. (2.) The destruction of all windfalls or injured fruit that drops, so as to clear away all fruit before the larvæ emerge and enter the ground to pupate. Poultry, pigs and sheep help well in this work. (3.) The ploughing up and cultivation of orchards so as to remove grass and other vegetation which, besides weakening the trees, gives places for the insects to hide in. The depth at which the larvæ pupate, is about an inch beneath the surface, and the pupation in this part of Canada takes place during July; therefore cultivation during that month will destroy many of the pupæ, and this has been found the remedy which has given the best results in old orchards which had been in sod for many years and in which the fruit had been seriously injured year after year.

The jarring of plum trees, which is much written about and highly recommended, will certainly destroy many of the beetles, but costs too much for labour when compared with spraying with insecticides, which give more certain results in my experience.

THE APPLE MAGGOT, *Rhagoletis pomonella,* Walsh.—This destructive insect has appeared in new localities during the past season. At Como, Que., on the Ottawa river, the attack was not less severe than in the previous year. This was undoubtedly due to the lack of concerted action on the part of all the apple-growers in the district. Some of the owners of the largest orchards made a great effort to destroy the infested fruit by feeding it to stock or burying it; but there were a large number of small orchards where nothing was done, and, as a consequence, the whole community had to suffer. Severe outbreaks occurred near Woodstock, in New Brunswick, and in Prince Edward county, Ontario. One or two other reports proved to be of other insects, which were spoken of under the wrong names.

THE OYSTER-SHELL SCALE, *Mytilaspis ulmi,* L.,=*Lepidosaphes ulmi,* L.—One of the remarkable occurrences of the past season was of the well-known Oyster-shell Scale, and this was not only on weak trees and in badly kept orchards, but was a special development of the season, which involved trees in well-worked orchards and vigorous shrubs in gardens. Unless some unexpected help comes from insect or fungous parasites, it is to be feared that there will be much destruction by this insect during the coming season. It is comparatively inconspicuous; and, even with those fruit-growers who have learned to detect the common enemies of their trees, it is so familiar that its possibilities of doing harm are frequently underestimated. Wherever this insect is found in orchards in large numbers, steps should be taken to invigorate the trees by special fertilizing and cultivation, and also to destroy the insects by spraying with whale-oil soap solution or kerosene emulsion, as soon as the young bark-lice are seen to be moving. This will be probably about the first of June in Central Ontario, a little earlier in Western Ontario, and gradually becoming later going eastward to the maritime provinces, where the young insects sometimes do not appear till towards the end of the month. After the leaves have fallen in the autumn, all infested trees should be thoroughly sprayed with a limewash, made of 1 lb. of fresh lime in each gallon of water. Two coats of the whitewash should be applied, and the second one may be sprayed on to the trees immediately after the first is dry. In sections where the lime-sulphur wash is used for San José Scale, fungous diseases or other pests, no other treatment will be necessary.

THE BUFFALO TREE-HOPPER, *Ceresa bubalus,* Fab.—From several localities in Ontario and Quebec, branches of apple trees have been sent in, which were injured by the females of the Buffalo Tree-hopper when they were laying their eggs. The remedy which is advised for this insect is close pruning in winter, by which as many as possible of the egg clusters are removed, and the keeping down of all weeds and low growth in orchards, upon which the full grown and immature insects feed. They are particularly attracted, it is claimed, to beans, and it has been suggested that some of these should be planted between the trees in infested orchards, as traps, the plants being sprayed with strong mixtures of kerosene emulsion or whale-oil soap when the larvæ or nymphs are found to be numerous. Although the eggs are laid in the wood of trees, the young insects spend very little time on the trees and resort almost entirely to low herbage for their sustenance.

THE SAN JOSÉ SCALE, *Aspidiotus perniciosus,* Comstk.—This terrible enemy of the fruit-grower continues to spread alarmingly in the district of Ontario which, from its first appearance in Canada, has been the only part of the province where it has gained a foothold. This area extends through the counties immediately north of Lake Erie, and as far east around Lake Ontario as a point a little east of Burlington in Halton county. The losses are certainly enormous every year, but the satisfactory fact must be recorded that, even in the worst infested districts good clean crops are being reaped by careful fruit-growers, who use the lime-sulphur wash systematically every year. A renewal of interest in the subject has recently taken place, owing to the activity of certain fruit-growers in the St. Catharines district, and to the energy displayed by a few public-spirited men in the neighbourhood of Chatham, Ont. In response to inquiries made by Mr. Herbert S. Clements, M.P. for the West Riding of Kent, and by instruction of the Hon. Minister of Agriculture, the whole question of the occurrence of the San José Scale in Canada was discussed before the Select Standing Committee of the House of Commons on Agriculture and Colonization, on March 6, 1907. Immediately afterwards, on March 8, a convention was held at St. Catharines by the Niagara Fruit Growers' Association, at which the subject of treating the San José Scale was the chief topic. This meeting was largely attended; and, in addition to the information imparted by the Dominion Entomologist, valuable addresses were given by Prof. H. A. Surface, of Pennsylvania, and by several of the practical fruit-growers who were in attendance. The consensus of opinion at this meeting was that, where the lime-sulphur wash had been carefully applied, the Scale had been controlled and good crops produced. It was also apparent, however, that a large majority of those who grew fruit in the district were taking no steps whatever to control the pest, and, as a consequence, their neighbours were subjected to much loss and expense. One point which was urged upon the meeting was that a uniform formula should be decided upon for making the lime-sulphur wash. During the discussion a remarkable diversity of opinion was expressed as to the exact quantities of ingredients to use and as to the time necessary to boil these so as to produce the proper chemical combination. Naturally, each experimenter considered that the formula which he had been using was the best one. As a result of this discussion, a committee of representative men from the various sections was chosen, and they were requested in the name of the association to investigate this matter, and that each one should during the coming season experiment with at least one other formula besides the one which he considered best. One great advantage of the lime-sulphur wash, which was acknowledged by all, and which, perhaps, accounts for its wide adoption by a large number of fruit-growers, is its undoubted efficacy in controlling a large number of fungous diseases. The manufacture and use of the lime-sulphur wash are decidedly unpleasant and troublesome; but its great value in destroying scale insects and many other fruit pests, besides fungous diseases, has rendered it very popular with all who have tried it.

WHITE GRUBS (*Lachnosterna* species).—A very common enemy of strawberry-growers is the White Grub so-called. This is the larva of one of the species of May Beetles or June Bugs. There are several species with somewhat similar habits, and, although most of these in American literature have been treated of under the name of *Lachnosterna fusca,* Froh., that species is by no means responsible for all the injury reported. There is even yet a good deal of uncertainty as to the exact time required for the larvæ or grubs to attain full growth. The usual statement is that the eggs are laid early in June. The young grubs hatch from ten to eighteen days afterwards and feed on the roots of various plants until autumn. As winter approaches, they burrow deeply into the ground, and, returning again to the surface on the opening of spring, do much harm by eating the roots of grasses and many other kinds of plants, particularly corn and potatoes, when sown on sod turned down the previous year. It is claimed by Dr. S. A. Forbes, of Illinois, that a second winter, and part of the following summer, are passed in the larval condition, and that the grubs do not change to pupæ till June and July of the third season. The perfect beetles, in such a case, would issue from the pupæ in August and September of the same year, but would remain through the winter in the ground and emerge the following May and June; thus three full years would be required from the time the eggs were laid until the perfect beetles appeared. It is probable that some of the confusion is due to the fact that several species with differing habits are spoken of under the one name of White Grubs. From a practical standpoint, it is a very important point to decide what the exact habits are, of any species prevalent in a certain district. It is probable that, during the first year after hatching, little harm is done by the grubs if they live for the longer period. On the other hand, if the larval period covers only two seasons, any one finding the nearly full-grown grubs in spring, in land which it is desired to put under crop, can by a slight change in the rotation of his crops use the land for a crop which may be sown late in June or early in July, and which would make small root growth before the time that the grubs ceased feeding to pupate in June and July. If, on the other hand, the species lives for three seasons in the land, a crop planted on fields seen to be infested in spring might be seriously injured by the grubs if they were in the second year of their growth and would be able to attack the crop throughout the season, no matter at what time it was sown.

The strawberry plant seems to be particularly attractive to the beetles for laying their eggs, and it is probable that more complaints come in concerning depredations on strawberries than upon any other crop. As general remedies, there are unfortunately no measures which can be depended upon for the destruction of White Grubs in farm crops; but, as the eggs are laid mainly in grass lands, land which has been in sod for several years should not be planted to corn or potatoes the first year after breaking. During the year of ploughing, the grass to a large measure feeds any grubs which may be in the ground, and the next year the roots of the crop grown on the land receive the full attack. It has been noticed that clover is seldom attacked by White Grubs; therefore, this crop becomes of special value for growing on land before it is to be used for corn or potatoes. In strawberry beds it is possible to avoid injury by adopting what is now known as the 'one-crop method,' which consists of taking only one crop of fruit from the beds, instead of leaving these down as was usually done in the past for several years. Mr. Macoun, the Horticulturist of the Central Experimental Farm, tells me that this is the best method, not only for controlling the White Grubs, but also in getting paying returns form the fruit crop. His experiments show that the best results are obtained from planting young runners in spring in new beds. By autumn these have grown into strong plants, from which the crop is gathered the following summer, and the beds are then ploughed down at once. If young plants are required in numbers of any variety, the beds can be left for a second year; but, to get large berries, which always pay best, the single-crop plan is the most satisfactory, and all beds should as a general practice be ploughed down after two crops of fruit at the most. Under this plan, the grubs have not time to complete their stages and produce beetles before the beds are ploughed down. Not only is this treatment an excellent way of controlling the White Grub, but two other serious enemies of this crop are also prevented from increasing. These are the Black Vine Weevil, *Otiorhynchus sulcatus*, Fab., and the Sleepy Weevil, *Otiorhynchus ovatus*, L., two beetles which on many occasions have done serious injury in strawberry beds, both on the Atlantic and Pacific seaboards. It has been particularly noticed with regard to these, as well as with the White Grubs, that their injuries are most severe in old beds which have been left standing for several years. Another advantage in growing strawberries under this new method, is that the Strawberry Rust and some other fungous diseases are also checked.

THE BROWN-TAIL MOTH, *Euproctis chrysorrhœa*, L.—Four years ago the first specimen of the destructive Brown-tail Moth was taken near St. John, N.B., and in July, 1905, another specimen was taken at Digby, N.S. Students of insects in Canada have been on the alert to detect any further specimens of this insect in those parts of Canada with which there was frequent intercourse with those infested States of New England where the insect was known to be doing so much harm. Although there have been frequent references in the daily press to the occurrence of the insect in destructive numbers, in various parts of the maritime provinces, all of these when investigated were found to be based on erroneous information. Early in the present spring an undoubted nest containing the caterpillars of the Brown-tail Moth was received from Mr. C. Perry Foote, of Lakeville, N.S. This was the first actual instance of the larvæ being found in Canada. Mr. Foote writes:

'On February 23, I was looking for nests of Tussock Moth and picked the webbed leaves I am sending you. As there were no eggs on the outside, I tore the nest open and was not a little surprised when I found inside it a great number of small caterpillars. I took them into the house and, being near the fire, in a very few minutes they were active, but did not move very much.'

Immediately on the receipt of these caterpillars, an article giving the habits of the Brown-tail Moth and advice as to measures which should be immediately put in force, was sent off to the leading agricultural journals in Canada, as well as to the local press in the places in Nova Scotia where it was thought that the insect would probably be found. At the same time the provincial government of Nova Scotia, through Prof. M. Cumming, Principal of the Agricultural College at Truro, took active measures towards the eradication of this serious enemy before it became more widely distributed. The following article was published in the *Farmer's Advocate* of London, the *Montreal Daily* and *Weekly Star*, the *Maritime Farmer* and other papers. Several local papers have reprinted such parts of the article as they considered of most interest to their readers:

THE BROWN-TAIL MOTH IN CANADA.

In 1902 Mr. William McIntosh, of St. John, New Brunswick, took a single male specimen of the Brown-tail Moth (*Euproctis chrysorrhœa*, L.) about 20 miles from St. John, N.B. About the same time another specimen was taken by Mr. Gordon Leavitt, at St. John; and in July of 1905, Mr. John Russell took a third specimen at Digby, Nova Scotia. Up to the present time these have been the only authentic records of this much-to-be-dreaded insect having been taken in Canada. Recently, however, I have received from Mr. C. Perry Foote, of Lakeville, Nova Scotia, one of the winter nests of the Brown-tail Moth, filled with the living caterpillars, thus proving that this insect has established itself at one place at least in Canada.

It was to be expected that the moths might be found here at any time, having been brought up direct from Massachusetts on one of the steamboats which ply regularly between Boston and the Maritime Provinces; but this would not necessarily prove that the insect had established itself. The occurrence of the young caterpillars, however, is a more serious matter, and shows that energetic measures are necessary at once to suppress and possibly to wipe out this unwelcome visitor before it becomes more widespread. The recognition of the winter nests is an easy matter, and this is the time of year to attend to their destruction. The Brown-tail Moth passes the winter as a very young caterpillar, and large numbers of these form colonies at the tips of the branches of the trees upon which they have been feeding the previous summer. The eggs are laid during July, and, on hatching, the caterpillars feed for some time on the upper surface of the leaves. As winter approaches, they crawl to the tip of a branch and bind together a few leaves so as to make a tent. This is securely closed up with silk, and the caterpillars remain dormant all through the winter and until the buds burst the following spring. These winter nests are easily recognized. from being almost invariably at the tips of the branches, and from being at this time of the year the only nests which contain colonies of living caterpillars. These latter are black, but covered with rusty hairs, and on the 10th and 11th segments towards the end of the body there are two very conspicuous reddish-yellow cushion-like tubercles, one on each segment, which the caterpillars can elevate or depress at pleasure.

WHAT TO DO NOW.

The only way in which the Brown-tail Moth passes the winter is in the shape of these half-grown caterpillars, little more than one-quarter of an inch in length, in colonies of between two and three hundred, inside these nests of leaves at the tips of the branches. These are easily seen, and everybody in Nova Scotia and New Brunswick who is concerned in the successful management of orchards, and every citizen who is interested in the beauty of the town he lives in, should examine and look to the destruction of every nest of leaves found to contain caterpillars, which he may notice. The destruction of these winter nests is the most effective means of keeping this enemy within bounds.

A DANGEROUS ENEMY.

With the exception of the San José Scale, there are no two insects which have attracted so much public attention, nor with regard to which so much money has been spent in America by the State and Federal Governments of the United States, as the Gypsy Moth and the Brown-tail Moth. Both of these are pests introduced into America from Europe—the Gypsy Moth about 1869, and the Brown-tail Moth somewhere about 1890. Millions of dollars have now been spent on fighting the Gypsy Moth and the Brown-tail Moth in Massachusetts and the adjoining States. Dr. Howard, when treating of this insect and of an effort which is being made to introduce European parasites, says, in the Yearbook of the Department of Agriculture for 1905: 'The Brown-tail Moth has become even more abundant and injurious than the Gypsy Moth, and, owing to the fact that the female flies readily, whereas the female of the Gypsy Moth does not fly at all, the Brown-tail Moth has far exceeded the Gypsy Moth in its spread.'

PLANTS INJURED.

These caterpillars injure nearly all of the large and small fruits, and many perennial plants. The pear and apple seem to be favourites; but stone fruits, elms, maples and the oak are also commonly injured. A list of over 80 different kinds of food plants was published in 1903. Thousands of fruit trees in the vicinity of Boston, Dr. Howard says, have been killed by the Brown-tail Moth.

THE BROWN-TAIL RASH.

Not only are the caterpillars of this insect voracious feeders upon the foliage of many kinds of trees, but they cause much annoyance from their stinging hairs, which cause excessive irritation when they come in contact with the human skin. Each hair is barbed, and at the time the cocoons are spun these hairs are broken off and carried by the wind, when they fall on the neck and other exposed parts of the body, giving rise to the painful rash, which is very serious with some people, even although they may not have actually touched the caterpillars. Dr. Howard's assistants who have been working on this insect, have suffered very severely; and persons engaged in removing the nests from trees in the winter time must be careful not to handle these nests too freely, or they may be inconvenienced by this rash. The nests should be cut off from the trees, placed in a basket with as little handling as possible, and burnt at once. Dr. Howard states that 'a large part of the popular feeling in New England that the Brown-tail Moth must be exterminated, is due as much to the annoyance of this rash as to the loss of vegetation from the caterpillars.' As a remedy for this rash a free use of vaseline is recommended.

DESCRIPTION OF INSECT.

The Brown-tail Moth resembles very closely the well-known Fall Webworm, being of a beautiful pure white, except the tip of the body, which in both sexes is brown, and from which the popular name is derived. The female bears at the tip of the body an almost globular tuft of brown hairs. Both sexes fly freely, and are much attracted to lights—a fact of some importance as affecting their spread. The search-lights of night-sailing passenger steamers have attracted so many as to have drawn the attention of the officers of such vessels, who reported that moths had alighted upon their ships in great numbers in the vicinity of Boston about midnight on several occasions, and the introduction of the species at more than one sea port in Maine is attributed by Dr. Howard to vessels coming from the infested districts rather than by natural spread by direct flight.

ONLY ONE BROOD IN THE YEAR.

The eggs are laid in masses containing about 300 eggs. These masses are brown in colour from a thick covering of the golden brown hairs from the tip of the body of the female moth; and the whole egg mass more nearly resembles a silky, downy caterpillar than a cluster of eggs. These masses average about two-thirds of an inch in length by one-fourth of an inch in width, and are found on the lower surface of the leaves in July. The caterpillars hatch in August, but do not injure the trees much before winter. As soon as the buds burst in spring, they are at once attacked by the caterpillars, which emerge from their winter shelters and do much harm

SUMMER TREATMENT.

If the winter nests of the caterpillars have not been destroyed, trees should be sprayed with arsenical or other poisonous washes, so as to destroy the caterpillars during May and June. The caterpillars of the Brown-tail Moth are not so resistant to the poisonous effects of Paris green as are those of the Gypsy Moth. The spraying of all orchards with the poisoned Bordeaux mixture as a regular practice is recommended to all Canadian fruit-growers as the best general means of securing first-class fruit free of most of the ordinary pests which injure fruits. As the Brown-tail Moth caterpillars attack many other kinds of trees than fruit trees, it will be necessary that they should also be sprayed, and for this purpose Paris green may be used. A good useful poison wash consists of Paris green, 1 pound; fresh lime, 1 pound; water, 160 gallons. It is a very usual practice, however, among fruit-growers to use more than 1 pound of Paris green with lime in the 160 gallons, and, indeed, 2 pounds may be used without danger if 2 pounds of lime are added. Arsenate of lead is a newer remedy of great value, from the fact that it does not injure foliage so much, and remains on the leaves for a longer time. Three pounds of arsenate of lead may be used in 40 gallons of water without injury.

RÉSUMÉ.

The Brown-tail Moth, which has been the cause of enormous loss in Europe and the United States, is undoubtedly established in one locality in Nova Scotia, and probably in several others. It is important to find out as soon as possible the range of infestation; and everybody is urged to send in as soon as possible any suspicious nests of insects, or clusters of leaves webbed together, particularly if they contain caterpillars, whenever any are noticed on their trees.

The collection of the winter nests is the best and easiest means of controlling this insect.

The collection of these nests must be done carefully, with as little handling as possible, and all should be burnt at once when cut from the trees.

This work must be done before the buds burst.

Any trees bearing nests of the Brown-tail Moth, after the buds have opened, must be sprayed with some poisonous mixture for the destruction of the caterpillars.

The establishment of the Brown-tail Moth in Canada is a serious matter, affecting everybody in the district where the insects occur.

What is now only a matter of considerable interest, may, if neglected, become a public calamity.

Specimens for examination may be sent to the Entomologist, Central Experimental Farm, Ottawa. If so addressed, no postage will be required.

JAMES FLETCHER.

Since the appearance of this article a vigorous campaign has been inaugurated by the officers of the Agricultural College, several members of the Fruit Growers' Association of Nova Scotia, school teachers and others. As a consequence, the fruit-growing districts of the province of Nova Scotia have been pretty thoroughly examined. Prof. Cumming writes that, as soon as he learnt of the occurrence of the Brown-tail Moth in Nova Scotia, he telegraphed to various places and arranged meetings where Prof. Sears and Prof. Smith, of the Agricultural College Staff, and Mr. G. H. Vroom, Inspector for Nova Scotia of the Fruit Division of the Dominion Department of Agriculture, could meet the people and learn all that was possible about the spread of the insect. As a result of this personal method of spreading information, a great deal of good work has been done. Prof. Cumming thinks that something like 2,000 nests of the larvæ have been destroyed. As each of these contains from 200 to 300 caterpillars, it is easy to see how strongly established the insect had become before it was detected. This was probably owing to the close resemblance between the Brown-tail Moth and the moths of the much less destructive Fall Webworm, which would be flying about the same time. It is of course also possible that some mistakes may have been made in identifying the caterpillars. This I found was very frequently the case on the part of some of my correspondents who sent specimens to Ottawa. The cocoons of the two common Tussock Moths were most often sent in with the inquiry as to whether they were the Brown-tail Moth nests or not. There was no excuse for this mistake, because the two insects do not resemble each other in any of their stages; but a very natural mistake was made in confusing the larval nests of the American Tent Caterpillars about the time that they first began to spin their tents, with the winter larval tents of the Brown-tail Moth. By examining them carefully, the differences can at once be noted; but to those who have made no special study of insects, this confusion of the two species is easily accounted for. Unfortunately, the discovery of the Brown-tail Moth in Nova Scotia was made so late in the spring that there was little time for destroying the nests before the larvæ began to leave them and attack the foliage. This difficulty was to a large measure obviated by the energetic measures adopted by Professors Cumming, Sears and Smith. Prof. Cumming reports: 'We have had five men going through the valley. As they have gone west, they have found the insect more thickly distributed. The worst infested district is at Doucetville near Weymouth, in Digby county. Unfortunately, some of the people there are backward in matters pertaining to agriculture; but our own men have destroyed all the nests they could find in that district, and last week the school children were started at work through a bounty of 3 cents per nest offered by our department. This bounty will hold good until May 31. I have already had word from two school teachers, one of whom reports 80 nests destroyed and the other 70 nests destroyed by the pupils. I visited Digby myself and went over part of the infested area with Mr. Vroom. I also discussed the whole situation with him and Prof. Smith. I was in hopes that we might be able to run one or two spraying outfits in some of the districts; but I found that this would be quite impracticable; for, although I have given the impression that a considerable number of nests had been found, yet this is the result of a very extensive search. In a four-mile drive we found altogether 15 nests. Many of these were in trees considerably removed from the roadside. If one were to attempt spraying in these areas after the leaves come out, I do not know how he could locate the trees, unless perchance they were so badly stripped that there were no leaves left to hold the spray. Another unfortunate feature is that most of the orchards in Digby county where the pest is located, are not of more than half an acre to two acres in extent, and they are so irregular and thickly planted, that Mr. Vroom, who has had a large experience in spraying, says that it would be a most difficult thing to work a sprayer in such places.'

The measures adopted by the provincial authorities under Prof. Cumming were the best that could be done under the circumstances; but it is now of the greatest importance that everybody during the coming summer should spray their orchards with great care. The remedy recommended is the poisoned Bordeaux mixture mentioned above; and as there is now no possible doubt that spraying is a paying operation from the fruit-grower's standpoint, it will have a double advantage in giving better crops of fruit, while, at the same time, everything will be done that is possible to control the Brown-tail Moth. The farmers and fruit-growers of Nova Scotia seem keenly interested in this matter and will probably do a great deal this summer and next winter to control this infestation. The government is anxious to adopt the wisest measures under the circumstances and every effort will be made during the coming summer to obtain advice and assistance from those best informed upon the subject.

In order that the insect may be recognized with ease, the following short descriptions of the various stages are submitted; but it would be wise for any one who has the slightest doubt upon the subject, to submit specimens either direct to this office or to send them to the Agricultural College at Truro, N.S., when the fullest information and advice will be gladly given. The descriptions are condensed from Dr. Howard's valuable pamphlet 'The Brown-tail Moth and How to Control it.' (U.S. Dept. of Agriculture, Farmers' Bulletin No. 264).

The Eggs.—The eggs are small and globular and are laid in elongated oval masses beneath the leaves in late July. The egg masses are brown and covered with silky hair, each mass containing about 300 eggs. The masses average about two-thirds of an inch in length by one-quarter of an inch in width.

The Caterpillar.—The full grown caterpillar is about two inches long, reddish-brown in colour with a broken white stripe on each side and two red dots on the back near the hind end. It has also patches of orange and is covered with tubercles bearing long barbed hairs. The tubercules along the back and sides are covered with short brown hairs as well as the longer ones. These give the tubercles when magnified, an appearance like velvet. The head is pale brown with dark motlings. The young caterpillars are blackish, covered with reddish-brown hairs, the head jet black. Close examination will show projecting from the back of the fourth and fifth abdominal segments (that is the eighth and ninth segments of the body counting the head as the first) a large tuft of reddish-brown hairs; and on the middle line of the ninth and tenth body segments is an orange or reddish tubercle, which may be withdrawn into the body. After the second spring moult the caterpillar is about three-eighths of an inch long, the yellow markings on the body are more apparent than before, but the brown tufts on the back less so, while the bands of white dashes along the sides characteristic of the full grown caterpillar, are now noticeable.

The Pupa.—The full grown caterpillar spins a cocoon of grayish silk so loose in construction that the pupa may be seen through it. The pupa is five-eighths of an inch long and dark brown in colour. It has yellowish-brown hairs scattered over the abdomen and on the top of the thorax. The cocoons are by preference spun among the leaves at the tips of branches, a dozen or more caterpillars frequently spinning one web, within which each individual forms its own cocoon and changes to a pupa. The cocoons are also found under fences and beneath the edges of clap-boards. A mass of cocoons nearly two feet across was found in the cornice of a house by Mr. A. H. Kirkland.

The Adult Moth.—The moths are pure white, with the end of the adbomen brown. Both sexes bear at the tip of the abdomen, but more conspicuously with the female, a tuft of brown hairs, almost globular in form. This is the only moth occurring in America to which this description applies, and it is therefore unmistakable. The female expands about one and one-half inches and the male is smaller. The moths fly in New England from the 1st to the 20th of July, the time varying with the season. It is a night-flying insect, few being seen on the wing in the day time. The time of greatest activity is from 10 o'clock to midnight. They are strong fliers and are attracted to light.

The Winter Webs.—The webs in which the caterpillars pass the winter are very characteristic, there being no other insect structures found upon trees in winter which can be mistaken for them. Any web consisting of two or three leaves spun together near the tips of branches and containing small brownish downy caterpillars in winter time, must be those of the Brown-tail Moth. In early spring, as soon as the buds begin to appear upon fruit trees, these young caterpillars, which are at that time one-fourth grown, issue from the nests and attack the leaf-buds and blossoms and later the foliage of the trees upon which they have wintered. The growth of the caterpillar is rapid; it reaches full size and begins to spin its cocoon during the last half of June, when it changes to a pupa and remains in this condition for about three weeks before the moths appear.

In addition to the above enemies, several other insects have been more abundant than usual in certain localities. In Nova Scotian orchards two insects have been conspicuous by their numbers and injuries. The White-marked Tussock Moth, *Hemerocampa leucostigma,* S. & A., and the Red or Rusty Tussock Moth, *Notolophus antiqua,* L., have been widespread, and not only devoured the leaves of the trees, but did much harm by gnawing cavities in the sides of the growing apples. Since the discovery of the Brown-tail Moth in New Brunswick and Nova Scotia, a great many specimens of the cocoons of Tussock Moths have been received for examination. These were found to be so much infested by various parasites that there is every hope that the injury by these insects will be very small during 1907.

Two other species which have been very much commoner than for many years, are the Yellow-necked Apple-tree Caterpillar, *Datana ministra,* Drury, and the Red-humped Apple-tree Caterpillar, *Schizura concinna,* S. & A. They are both large and voracious caterpillars which feed in colonies and sometimes strip a whole branch of a tree before their presence is noticed. I have never known either species to be in sufficient numbers to require any other treatment than the cutting off of the colonies and destroying them. A remarkable fact about the Red-humped Apple-tree Caterpillar is the very large proportion which are always found to be parasitized. This was the case last season in Nova Scotia and was also observed in Maine by Miss Patch, the State Entomologist. The parasite which does good work, is a small four-winged fly about ¼ of an inch long, with a black body and red legs, prettily banded with black and white. The eggs are inserted into the body of the caterpillar and the grubs become fully developed before the caterpillars are half grown. They then spin a thin double cocoon, loose and white outside, but black, and of almost skin-like textur within, inside the dried up skin of the caterpillar, which soon turns white and show by contrast very conspicuously the black head and tubercles of the dead larva. Th name of the friendly parasite is *Limneria Guignardi,* Prov.

A CHERRY FRUIT-FLY (*Rhagoletis cingulata,* Loew.).—I have received from M W. R. Palmer, of Rockside Orchard, Victoria, B.C., some specimens of puparia of fruit-fly which is justly causing him much anxiety from its injuries to cherries in hi orchard.

Victoria, B.C., October 10.—'I send you samples of Olivet cherries which hav been infested by a small white maggot. I also send you some of the puparia for you inspection. Their presence is first noticeable by a small round hole in the fruit. O opening the cherries the grub will be generally found inside. It works around th stone and when full grown leaves by the hole and drops to the ground. The maggot all disappear from the fruit as soon as it is fully ripe, but the cherry is spoiled b being made rotten around the stone and is rendered of a darker colour.

'As they have increased this year, I have become very much interested in ther and hope you will be able to identify them and give me some means of preventin their injury.'

Mr. Palmer was written that the insect answered in every particular to the Cherr Fruit-fly described by Prof. Slingerland in Cornell Bulletin 172, September, 189 This insect had never so far been recorded as injuring cherries in any part of Canada the occurrence, therefore, was of great interest and all facts concerning it were aske for.

Victoria, November 5.—'I will try and give you all the particulars I can regarding the cherry insect, *Rhagoletis cingulata* (?), as you call it. Unfortunately, I di not keep exact dates. I first noticed the holes in 1904. Last year my brother foun one in a Novelle Royal, and this year they were quite numerous on two particula trees that we think are dying from defective root stocks and which therefore are no in a very healthy condition. They have confined themselves so far to three varieties Olivet, Novelle Royal and Morello. The last named they do not seem to care ver much for; but we found a few in them this year. The trees are eleven years old. do not know of these insects being anywhere else. I think our trees were the firs planted here of these varieties, the other growers who have them, have very few i bearing. A great many of the Olivet are now being planted.

We have not found any in the Sweet cherries, either early or late, so I am inclined to believe that they prefer preserving cherries, perhaps the reason is they ar softer and more juicy. I will try the gas-lime treatment you recommend and shal apply it at once.'—W. R. PALMER.

If the identification of the insect which is attacking cherries in British Columbi is correct, the parent of the maggots is a pretty little black and white fly very much like the fly of the Apple Maggot.

Unfortunately, up to the present time, no remedy has been found to be effective against this enemy, and although an autumn application of gas lime to the land under the trees which were infested, was recommended, I have since learnt that this was not found effective in some Australian experiments. It is claimed that this fly spreads slowly and the drastic measure has been suggested of destroying all the fruit on an infested tree as soon as the presence of the maggot is detected.

FOREST AND SHADE TREES.

There has been frequent inquiry during the past year with regard to the depredations of insects upon forest trees and also upon trees grown for shade or ornament in cities. The Tent Caterpillars are again becoming numerous in some parts of Quebec and the Maritime Provinces. The Forest Tent Caterpillar has been particularly noticeable in Nova Scotia, and Father Burke reports their webs as 'conspicuous everywhere' in Prince Edward Island. The Tussock Moth, *Hemerocampa leucostigma,* S. & A., still does harm in the streets of Toronto and, to a less degree, in Montreal. Active measures are being taken by the city authorities, and there is no reason why the unsightly injury to the shade trees, which are such an ornament and advantage in crowded cities, should not be entirely wiped out. The Fall Webworm, *Hyphantria textor*, Harris, is decidedly on the increase throughout Ontario and eastward to the coast. Its injuries seem to be most severe on elm trees; but every kind of shrub and deciduous tree is at times eaten by the larvæ. In one instance the foliage of a strawberry bed near Ottawa was badly stripped. In Manitoba and the Northwest Provinces the Ash-leaved Maples were much disfigured by an Anthomyian Gall-fly and the specimens of the fleshy galls received during June and July were filled with the red larvæ of the fly. This attack has been observed in the West for many years, and the galls are known by the name of the Fleshy Negundo Leaf-gall. Although unsightly on the trees, both in the fleshy condition and after they dry up for some time, no permanent injury is done to the trees. In the Eastern Townships of Quebec province, in several of the towns, the elms were badly infested by the Woolly Elm-leaf Aphis, *Schizoneura americana,* Riley, which gave the trees a dirty appearance and rendered resting under these trees very uncomfortable from the large amount of honeydew which was emitted.

There was considerable inquiry with regard to scale insects of all kinds, both on fruit trees and ornamental shrubbery. This was a direct outcome of the revived interest which has taken place in the injuries of the San José Scale.

The Spruce Gall-louse, *Chermes abietis,* L., has spread widely and during the past summer was much inquired about from those in Western Ontario who had bought or who were growing spruces for ornament. The insect was treated of in full in my Report for 1905, at page 190.

The Vancouver Island Oak-looper, *Therina somniaria,* Hulst.—This destructive insect was again enormously abundant on the beautiful oaks around Victoria, B.C., and from these trees the hordes of caterpillars spread to some other trees in the vicinity and stripped them also of their leaves. Small trees were easily protected by spraying with arsenites.

An occurrence of more than usual interest was the destruction of the seeds of the Silver Maple, *Acer dasycarpum,* at Ottawa by the larvæ of a small Nitidulid beetle, *Epuræa rufa*, Say. The seed of this tree was produced abundantly in 1906; it was ripe by the middle of June, and at that time fell to the ground. Towards the end of June some sacks of the seed were raked up from the ground and saved for sowing. They had lain on the ground for some days, but were apparently in good condition. Upon examining some of these about a month later, it was found that nearly every seed contained from 12 to 18 slender grubs about a quarter of an inch long, of a dirty white colour, with a honey-coloured roughened patch across the middle of each segment on the back. When fully fed these grubs left the seeds, of which they had reduced the contents to a green meal-like powder. The pupal condition was passed just beneath the surface of the ground and in August swarms of the beetles emerged. There were also found large numbers of the cocoons of a parasite, which emerged early the following spring. The beetles of the family to which *Epuræa rufa* belongs, are for the most part scavengers in habit, living on dead and decaying animal and vegetable substances. In the above instance, however, sound seeds were certainly attacked, and this species can evidently be a destructive enemy of one of our favourite shade trees.

THE WHITE CEDAR TWIG-BORER.—For the past two years the White Cedar or American Arbor-vitæ has been seriously disfigured in the Ottawa district by the attacks of the caterpillars of some minute moths. These have been reared, and, through the kindness of Mr. Aug. Busck, the species have been identified. The injuries of these minute insects have been so severe throughout the Ottawa district, both on cultivated trees and in the woods and swamps, as to give a rusty sickly appearance to all of the White Cedars in the district, on account of the large number of the tips of the young twigs which have been killed by the minute caterpillars boring inside them in autumn and again in spring after they had revived from their winter torpor. These tiny caterpillars are about one-eighth of an inch long when winter sets in, very slender, of a general olive green colour, brownish towards anal end. The head is black and shining, the thoracic shield piceous. These caterpillars pass the winter singly inside the mines and revive again the next year in the hot weather at the end of April. They are about one-quarter of an inch long when full grown. The beautiful little moths, silvery white with brown markings, were found flying in clouds around the trees during the latter half of June. It had been noticed last year that there were apparently two different kinds of moths at work on the White Cedars. Consequently, last spring a supply of the infested twigs were sent to Mr. Busck, the eminent tineidologist of the United States National Museum, who kindly examined the material carefully and sent me much valuable information concerning the species he found. Mr. Busck writes as follows:—

'June 13th. I hurry to inform you that the moths from the mines on *Thuya occidentalis* which you sent me last week for determination, are now issuing, and I find that only a small fraction prove to be *Recurvaria thujaella,* Kearfott. The large majority (20 to 1) belong to what Packard described as *Bucculatrix thuiella.* The species, however, does not belong to *Bucculatrix,* but to the genus *Argyresthia,* Hubner, and should thus be known as *Argyresthia thuiella,* Packard.

'This then is the species which is of economic importance in your case, and I am very glad to have become personally acquainted with it.'

June 18.—'Please send me some more of the infested twigs of *Thuya occidentalis,* because this morning I have found a third species of moth which has issued from the material you sent me before. I should like to get more of this, and there are still several points in the life history of all three species which might profitably be studied more carefully.

'So as not to get matters mixed up, let me recapitulate. First. I have bred in very large numbers a small pearly white moth with brownish obscure markings (costal-dorsal and apical spots), white head and thorax, white brown-ringed antennæ. This is a species of *Argyresthia* and is the same as was described as *Bucculatrix thuiella* by Packard. This, in spite of the fact, as I was well aware, that Packard described cocoons from which his moths were supposed to have issued, while the present species does not spin a cocoon, but issues directly from the mines (at least, in captivity), as you have rightly observed.

'Packard may have observed and wrongly connected with his species other small cocoons, for example those of *Recurvaria thujaella,* which may have been quite numerous in his lot and which are rather striking objects, naturally connected with the issuing species, whichever it be. Strangely enough, the genus *Argyresthia* generally spins just such a cocoon as described, and I have another species on Cypress which has nice normal cocoons; so, in this particular our species is aberrant. My reasons for identifying the species as Packard's Bucculatrix, which I have all along suspected to be an Argyresthia, are shortly that: (1) no Bucculatrix, so far as I know, feeds on this group of plants; (2) a large part of the genus Argyresthia is attached to Juniperus and its allies; (3) Packard's description fits our species well; (4) no other species is known on Thuya, which could possibly be confounded with it; (5) his figure—however poor—is not that of a Bucculatrix, but fits decidedly the present species.

'Second. Connected with this species and working in a similar manner, but in insignificant numbers, I have bred *Recurvaria thujaella,* Kearf. This species spins a small whitish cocoon.

'Thirdly. I have to-day bred one specimen of another species *Argyresthia freyella,* Wlsm., which belongs to the golden metallic group and is a juniper feeder.

'I have also bred the same little parasite with flagellate, five-branched antennæ in the male, which Packard mentions. Dr. Ashmead has identified this as *Pentacnemus bucculatricis,* Howard. Besides this interesting little parasite, I have also bred *Derostenes trifasciatus,* Ashm., a fine blue chalcid with coloured wings, determined by Dr. Ashmead and a *Hemiteles* sp. as yet not determined.'

These same parasites mentioned by Mr. Busck were also reared here at Ottawa in very large numbers; but they did not seem to be sufficiently numerous to reduce to any material extent the severity of the infestation; for the trees are still much disfigured by the injured twigs, which have been conspicuous during the past autumn and now (March 30) still contain the living larvæ, which will continue their work on the return of warm weather. The larger number of parasites, however, gives every reason to hope that this outbreak will soon come to an end.

DIVISION OF BOTANY

A NORTHWEST TUCKAHOE.

From time to time farmers in Manitoba and the Northwest plough up in their fields large black irregular balls of an india-rubber-like substance which always give rise to much curiosity, and many have been received for report. These when received had usually been out of the ground for a considerable time and were hard and almost stone-like in consistency. Last summer, through the courtesy of the *Farmer's Advocate* and of the Winnipeg *Free Press,* a request was published for fresh material, and several correspondents sent me specimens. When received they were of a firm elastic consistency like india-rubber and, as stated by Prof. Farlow, of Cambridge, Mass., were evidently the sclerotia of some fungus, probably a Polyporus. These objects were of a somewhat spherical shape, varying from 3 to 9 inches in diameter and weighing from 1 to 7 pounds. The outside was smooth and black; the inside very dark olive-black and the substance granulated by reason of the ramifications of mycelial threads. Most of them also contained in the substance, coarse grains of sand. All showed traces of having been at some time attached to the roots of shrubs or trees. One specimen surrounded a piece of poplar wood, showing the bark plainly. From this and from available evidence, it would appear that the fungus is at first parasitic on poplars and perhaps willows. In July, 1906, I received from the West, three of the large sclerotia or fungous masses in a fresh condition, and these were buried in the earth about 6 inches beneath the surface. On July 3, 1907, I had the great satisfaction of finding two fleshy toadstools, yellowish-white above, white beneath, of a species of *Polyporus,* which so far I have not had identified. Mr. F. T. Shutt has kindly made the excellent photograph which I give herewith, showing one of the toadstools attached to the sclerotium. Owing to the great interest which has been evinced in this matter by western farmers, I publish this preliminary note.

Prof. Roland Thaxter, of Cambridge, Mass., who had planted last year one of the sclerotia for Dr. Farlow, to whom I had sent it, writes under date of July 18, 1907:—

'A week or two ago the sclerotium which Dr. Farlow gave me and which I planted two years ago, fruited as yours has done. I sent the Polyporus directly to Dr. Farlow who recognized it as a European species which I believe he had not seen before. It is a beautiful thing and I think he will no doubt write you further concerning it.'

Dr. Farlow tells me that this Northwest fungus is most nearly allied with the Southern Tuckahoe or 'Indian Bread' upon which an article appeared, by J. H. Gore, in the *Smithsonian Institution Miscellaneous Collections,* Vol. XXV., 1883.

I have no knowledge of this fungus having been used for food, and, owing to the large amount of sand and grit sometimes inclosed, it could probably hardly be used. It is tasteless when masticated raw. In one of the extracts given below from some of the letters received, it is spoken of as having been used by the Indians for medicinal purposes.

Winnipeg, April 25, 1903.—'Under a separate cover I mail you a curious ball of rubbery substance 7 inches in diameter, found about 15 miles northeast of Winnipeg, at Moose Nose—part of Birds Hill. This has hardened since found last summer. Will you please tell me what it is; its nature, name, and composition. Also refer me to any printed matter about similar formations.'—Howard T. Irvine.

Cromwell, Man., May 7, 1906.—'I notice a letter of yours regarding a black ball-like fungus ploughed up in parts of Manitoba. I ploughed up several last summer, and when I backset the land next week, no doubt I shall find some more. I was at a loss to explain what was the nature of the growth for some time, but I think I have found out the real nature of the fungus. A few years ago this land was covered over with large white poplar trees, which had very large fungi on the trunks when they began to decay; then they decayed and blew down. The fungus has not decayed so rapidly and being of a spongy nature is not very easy to burn, as I have tried to burn them. They are never found on prairie land, only on old bush land.'—GEORGE BOYD.

Welwyn, Sask., May 8.—'A day or two ago I read in the *Farmer's Advocate* your request for a certain fungus, but never having seen one did not expect to be able to accommodate you with a specimen. However, to-day, when grubbing out some willow and poplar roots from a piece of backsetting, I found the object which I am forwarding under a separate cover and which I feel positive from your description, is what you want. There was of course, considering the time of year, no fungus attached to it.'—F. J. COLLYER.

Notre-Dame de Lourdes, Man., May 12.—'I send you by mail a black ball-like fungus, as you ask in the *Farmer's Advocate.* It was attached to the back of the stump of a poplar, which I send you too in the box.'—ALBERT DE BRIANT.

Saint Louis, Sask., May 18, 1906.—'I saw in the *Farmer's Advocate* your letter concerning the "curious black ball-like fungus." This fungus is very common in our district, and I noticed it long ago. The Indians call it "Médecine de terre" (ground medicine). They use it for poulticing. I do not discuss its properties in this respect.'—JULES GODARD.

Cromwell, Man., May 22, 1906.—'Yours of the 16th to hand. I am sending a specimen of fungus growth that I ploughed up to-day. It is slightly cut with the plough share, and not very large. I got several last year, as large as a man's head.' GEO. W. BOYD.

Togo, Sask., May 26.—I saw in the Winnipeg *Free Press* you want to get a sample of fungus. I presume this is the fungus you want. I have ploughed up several pieces of this same, some pieces weighing 3 to 4 pounds. This piece, I ploughed up alongside of a poplar bluff. I have ploughed this piece of ground three times, and I think it is a new piece.'—JOSEPH DICKIE.

Miami, Man., June 4.—'I am sending you specimens of fungus as per your request in the *Farmer's Advocate.* The specimen that is cut with the plough, has only been unearthed a few days. The other, I found on top of the ground a week or so ago. The freshest one had its stem embedded in a piece of rotten wood. I have noticed what appears to be the same fungus, growing on old logs where some soil has got knocked on to them, generally burnt logs. Those I have found on the logs have always been small and flat, and without the stems that the larger ones have. Larger ones are generally deeper in the ground than the smaller ones. Have found them as deep as 8 or 10 inches to the bottom of them, and having a diameter of 4 to 6 inches.'—H. T. DUNCALFE.

Togo, Sask., June 8.—'I received your letter of May 31. I herewith send a small piece of fungus I picked up since I sent you the first. It is somewhat dried, but I thought I had better send it. I do not expect to be able to get any more this summer, as I never get it or see it only when ploughing stubble; so I think it must either grow quick or is deeper in the soil than the breaking of the prairie sod. The soil is a sandy, very rich and mellow, subsoil clay. I have ploughed up several pieces of fungus, have examined them and thrown them away. If I had known sooner, I could have sent you plenty. Hope this small piece may be of use to you, and if I get any more, I will send it to you.'—JOSEPH DICKIE.

Gilbert Plains, Man., June 23.—Some time ago I saw an article in the *Farmer's Advocate* from you about a certain fungus growth sometimes ploughed up in this district, requesting that specimens be sent you. You will find inclosed a small one of them which was ploughed up a day or so ago. There was nothing attached to it in any way, but was just as it is inclosed. I would be very much pleased to know the name of this fungus, as there have been a number of them ploughed up here at different times, always, I believe on light land.'—E. R. Dow.

Duck Lake, Sask., June 25.—'I am this day sending you by mail a sample of what appears to me to be a fungus. This grows, or is found, about 6 or 8 inches below the surface by farmers when ploughing in some localities. I have had several samples brought me by different ones for information. The two I am sending you are quite fresh now. When exposed, it becomes as if petrified. I saw an article written by you requesting any one finding such a substance (and this I believe corresponds to the article you describe), to send it to you for investigation by a specialist in fungi. After this research I should like very much to receive the results for the benefit of myself and farmer friends.'—R. T. Shepherd.

Holland, Man., July 9.—'I send you a fresh fungus ball, which I have just ploughed up. Will you kindly let me know about it? It was cut by the plough.'—John C. Walker.

Gilbert Plains, Man., July 14.—'I have received your letter of the 28th of June, acknowledging the receipt of the fungus which I had sent you and asking for further information about the same. I have been trying to learn something further about this, but so far, have not succeeded in getting much information. You ask if it does not always grow on land where there are, or have been, poplars growing recently. I do not think this is correct, as, while the land where it is found is generally more or less covered with poplar and willows, it is found on open spaces of land where there have never been trees. I cannot find that it has been, in this district at least, found attached to any plant, although there are sometimes marks or grooves on its surface caused by its growing among roots. You are correct as to their growing at a depth of four or five inches. As to the size of the largest I have seen, I have one at present that measures six by eight inches, and weighs about six pounds. I have seen larger ones than this, but did not measure or weigh them. I think the largest would be nine or ten inches in diameter, but could not say as to the weight. If I notice any large toadstools at any time, I will dig down and see whether one of these fungi is attached, and I will be pleased to send you any further information which I may obtain. I may say that while it is usually found on light gritty soil, it is sometimes found on heavier soil, although not of so large size as on the light.

'While writing the above another of these fungi was ploughed up, which I have weighed and measured. It is six and a half by nine inches in diameter, and weighs nine pounds. This is about as large a one as I have seen. As I thought you might like to have it, I am sending it along with this.'—E. R. Dow.

Mekiwin, Man., July 14.—'I have to-day sent you by mail a specimen of a black fungus which grows under the ground, principally in wooded parts of the country, and more plentiful when the woods have been destroyed by fire. I think this is the fungus which you were desirous of getting. I do not think that it has any connection with any toadstool above the ground, as toadstools are very scarce in this part of the country. This fungus is found only on first breaking the soil. I have never seen any on old ploughings. Trusting it reaches you safely, and that it is what you were desirous of getting.'—Archd. S. McGregor.

Moosomin, Sask., November 8.—'I saw by *Farmer's Advocate* last summer that you wished to get samples of a kind of fungus that grew in the ground. I will send with same mail as this, one that I found one day this week, and which I think is the kind you want. I found it when doing a little bit of breaking, and as you will see, the plough share took a slice off the top side of it. The soil where I found it, was clay loam, with black soil on top, perhaps 10 yards from a small slough with scrub between and some small bushes all around. I also found one of the same kind a few years ago when breaking, it was near a slough too, and there was also scrub near it, but I think rather lower and heavier land. The scrub in both cases was small, mostly medium sized willow. I also took the top off that one with the plough too. The soil where I found this one was full of roots from the bushes and weeds.'—W. R. Adamson.

REPORT OF THE CEREALIST.

CHAS. E. SAUNDERS, B.A., Ph. D.

OTTAWA, March 30, 1907.

DR. WM. SAUNDERS, C.M.G.,
Director Dominion Experimental Farms,
Ottawa.

SIR,—I have the honour to submit herewith the fourth annual report of the Cereal Division.

During the past year, as in previous years, a large proportion of my time has been given to the various problems connected with the growing of wheat in those parts of Canada which have only comparatively recently been open to settlers; but, at the same time, the needs of the other districts, where farming has been carried on for many years, have not been overlooked. Attention has also been given to the other important cereals, as well as to those fodder crops which are included in the scope of this Division.

The very large number of details which required my personal attention in connection with the crossing and selecting of cereals, the grinding of wheat and the baking tests of flour made it impracticable for me, this past year, to attend meetings away from Ottawa or to undertake any long journeys for the study of cereal growing in Canada. I attended, however, the annual meeting of the Canadian Seed Growers' Association held in Ottawa in June and presented a paper on 'Quality in Wheat.'

For samples of interesting cereals, I am indebted to the Department of Agriculture of the United States, the Colorado Agricultural Experiment Station, Mr. George Aitken of Woodstock, Vermont, the Guinness Research Laboratories, Dublin, and the Department of Agriculture of Russia.

It gives me pleasure to acknowledge the very valuable help which has been rendered to me by Mr. George J. Fixter, foreman in charge of the field work of this Division.

In the following pages I have endeavoured to give a fairly complete though necessarily very brief account of some of the most important experiments carried on during the past year.

I have the honour to be, sir,
Your obedient servant,
CHARLES E. SAUNDERS,
Cerealist.

CROSSING AND SELECTION OF CEREALS.

Only a few new crosses were attempted this year, as the selection of the progeny of the very large number of cross-bred sorts now on hand occupies all the time that can possibly be spared for such work. Crossing is a comparatively simple matter, but the work of selection which necessarily follows, for several years after the cross has been made, is difficult and exacting.

About 1,400 very small plots of cross-bred cereals, most of which are not yet fixed in type, were sown and from these about 4,500 plants were selected at harvest time.

Careful study of these during the autumn and winter months made possible the rejection of most of them, leaving the seeds from about 700 plants to be sown this spring. Among these there are many very promising varieties.

From the seeds produced by crossing in 1905, some very interesting plants were grown this past season. Two groups of these deserve special mention, on account of their scientific interest as well as because of the useful varieties of grain which may be produced from them by selection. Mensury barley, a bearded, six-row sort, which retains its hull when threshed, was crossed with Triple Naked, a beardless, two-row, hulless sort. Eight seeds were obtained (in 1905) using the Mensury as female, and six using the Tripple Naked as female. All the seeds germinated when sown this past season and the fourteen plants were all alike. The heads of grain produced were beardless and almost of the pure two-row type, although the four rows of empty scales sometimes contained a few small kernels. The kernels retained their hull. The entire absence of the normal, long awns in these cross-bred plants is in accord with observations made in other cases where bearded and (so-called) beardless kinds of barley have been crossed.

In crossing cereals it does not seem to make any difference in the progeny whether one or the other parent is used as female. The writer has studied several cases where the cross has been made both ways and has not yet found a single instance where any difference could be seen between the two.

The work of carefully re-selecting the most important varieties of cereals grown on this farm has been continued during the past year. Many of the new strains of wheat were on hand in sufficient quantity for the sowing of $\frac{1}{40}$-acre plots, the result of the use of this selected seed being a great gain in uniformity and sometimes in other respects also. It is important to notice that each of these new strains has been bred from a single, selected plant. For several years past the seed for some of the plots has been obtained by the selection of heads just before the grain was harvested; but it has been found that the improvement effected by this method is much less marked than that produced by selecting one extra good plant and multiplying the seed of that plant until a sufficient quantity is on hand for a whole plot. This latter method also enables one to avoid the very real danger attendant upon the selection of extra large heads which sometimes owe their unusual size to the fact that they are produced from comparatively unproductive plants (bearing only one head), while in other cases they belong to some different variety which has become mixed to a certain extent with the desired sort.

SAMPLES OF GRAIN FOR GRADE AND NAME.

Attention is called to the fact that the Cerealist, while always willing to give any information in his power in regard to the quality of samples of grain submitted to him, cannot undertake to state what grade would be given to them by the regular inspectors. Although the Grain Inspection Act defines to a certain extent the different grades of grain, much necessarily depends on the judgment of the inspector himself, and it is therefore quite impossible in many cases for any one else to determine what grade will be given to the grain when it reaches the office of the inspector.

Samples submitted for name should always be sent in the head and accompanied by such details in regard to earliness, length of straw, &c., as can be given. When threshed grain alone is sent, without any information, it is frequently impossible to determine the name of the variety.

Samples are carried free through the mails if addressed to the Cerealist, Experimental Farm, Ottawa.

QUALITY IN WHEAT.

During the past two winters the writer has been carrying on milling tests of wheat and baking tests of flour. The objects of these tests have been to gain information in regard to the quality of the ordinary commercial varieties of wheat, such new sorts as might be imported and the large number of new cross-bred kinds which have been produced at this farm. In previous years it was not possible to obtain this highly desirable information until quite a large quantity of each variety was grown; but now, by the use of a small, experimental flour mill and by the development of a suitable system of baking tests it is quite practicable to determine the quality of every variety when only a small amount of seed is on hand and before it has been distributed for test elsewhere. It is felt therefore that under the present improved conditions it would be unwise to introduce any new wheat until after its quality has been determined.

The details of this investigation are too lengthy for insertion in this report, and it is therefore proposed to publish them in bulletin form. One or two of the most important conclusions drawn may, however, be given here.

The practical identity of the flour made from White Fife wheat with that produced from Red Fife wheat has been established. It has also been shown that these two varieties produce flour of the very highest baking strength.

Among the winter wheats it has been shown that Turkey Red yields flour of quite remarkable strength, very little inferior to Red Fife.

The strength of flour from very hard wheat has been shown to be much greater than that from very soft wheat of the same variety when grown in the same district and in the same season.

Some very decided variations in strength have also been observed when studying similar samples of the same variety grown in different climates.

The beneficial effect of age on the baking strength of flour has also been shown.

CEREALS IN SMALL PLOTS.

An alphabetical list of the principal varieties of the different cereals grown in small plots during the past season is here given. The total number of these plots was about 70. Those varieties which are given under letters and numbers are new sorts produced at this farm, and now fixed in type but not yet named. The numerous small plots of unfixed cereals are not referred to in this list.

Spring Wheat.

Bishop (3 strains).
Campbell's White Chaff.
Club.
Downy Riga D.
Early Haynes' Blue Stem.
Early Russian.
Grant Yellow.
Herisson Beardless.
John Brown.
Ladoga
Miller.
Moscow.

Preston (5 strains).
Princess.
Pringle's Champlain (3 strains).
Red Fife (6 strains).
Stanley C.
White Fife (5 strains).
3 B 3 (Dawn × Red Fife).
6 F 2 (Red Fife × Polish).
6 T “ “
7 D 3 (Red Fife × Roumanian).
7 E 3 “ “
7 J 4 “ “

Durum (or Macaroni) Wheat.

Cretan.

Oats.

Black Mesdag.
Sixty Day White.

Sixty Day Yellow.

Six-row Barley.

Archangel, No. 59.
Archangel, No. 62.
Success.

Vologda, No. 447.
Vologda Blue, No. 448.
Vologda White, No. 448.

Two-row Barley.

Black Two-row.
Caucasian Hulless.
Early Chevalier.
Eriwan.
Kars.
Kinyer Chevalier.
Large Naked.
Triple Naked.

Peas.

Arthur Selected.
Forrest Brownie.
Green Marrowfat.
Zulu.

UNIFORM TEST PLOTS OF CEREALS, FIELD ROOTS AND FODDER CORN.

The standard and new varieties of cereals which are obtainable commercially are annually grown in plots of one-fortieth of an acre, along with the cross-bred sorts produced at this farm and other varieties obtained from various sources. The field roots and fodder corn are grown in somewhat similar plots, the yield being usually estimated from the crop obtained from one-hundredth of an acre. The object of these tests is to determine the relative productiveness, earliness, &c., of the different varieties. Those which for a series of years are found to be distinctly inferior are rejected, in order to keep the list within as small bounds as possible.

The number of these larger plots grown during the past season was as follows:—Spring wheat, 65; durum wheat, 15; winter wheat 23 sown, 4 harvested; emmer and spelt, 12; oats, 67; six-row barley, 34; two-row barley, 30; peas, 26; spring rye, 2; winter rye, 3; mixed grain, 6; field beans, 4; flax, 7; turnips, 20; mangels, 16; carrots, 10; sugar beets, 8; Indian corn, 35; making a total of 233 plots. These represent about 355 varieties.

IMPORTANCE OF EARLY SOWING OF CEREALS.

Repeated tests have been made at this farm to ascertain the best time in spring for the sowing of cereals in order to obtain the largest possible yield. The experiments have proved that in this climate cereals should generally be sown about as soon as the land can be brought into proper condition. The reduction in yield due to delay in seeding is usually considerable, even when the delay is only a week long. The loss is especially serious with wheat and oats, and is sometimes quite disastrous in seasons when rust is abundant. The comparatively large yields obtained in the experimental plots on this farm are due in part to early sowing.

The best time for sowing cereals on this farm has been found to be from about April 20th to 26th in an ordinary season.

WEATHER.

Spring and early summer were favourable, but the dry weather which set in about midsummer and continued without much break into the autumn, kept down the yield of some of the cereals as well as of the field roots and fodder corn. The very early cereals did well. Rust was noticed in considerable quantities, but did less damage than in some other seasons.

SPRING WHEAT.

Several new varieties and selections of wheat were added to the regular plots last season. It seems unnecessary to give descriptions of these so long as they are under test at this farm only; but such sorts as are being sent to some of the other experimental farms, or elsewhere, for trial are here described.

Aurora.—This variety was obtained by the selection of a very early and strong plant produced by growing some mixed wheat imported from India under the name of 'Gehun.' Kernels hard, of a dark red colour and of about medium size, but somewhat long. Heads of medium length, tapering, bearded. Chaff downy and of a straw-yellow colour. Straw short and of good strength. Ripens remarkably early and gives a good yield. This variety produces flour which is of a somewhat deeper cream colour than that made from Red Fife, and of distinctly lower baking strength. It is not recommended as a desirable wheat for export, but is likely to be of value as a parent in cross-breeding.

Bobs.—This variety was received from the originator, the late Wm. Farrer of New South Wales. It is regarded in Australia as an excellent wheat for milling and baking and is said to have considerable power to resist rust in the warmer districts of that country. At Ottawa it is quite as much subject to rust as most other varieties, but its earliness and the high quality of the flour obtained from it are strong points in its favour. Unfortunately the kernels have a yellow skin which, in view of the present laws and prejudices in favour of red wheats, will in all likelihood prevent this variety from being grown in the great wheat-producing provinces where (in some sections at least) it would probably be of great value. Kernels yellow, of medium size, usually quite hard. Heads of medium length, not sharply pointed, beardless. Chaff smooth and of a straw-yellow colour. Straw stiff, rather below medium length. Ripens a few days before Red Fife. Yields flour which very closely resembles that produced from Red Fife or White Fife, both in appearance and in baking strength.

Chelsea.—This wheat is a selected, superior strain of the variety grown for some years under the name of 'Chester.' Parentage, Alpha (female) crossed with Gehun (male). (Alpha was produced by crossing Ladoga with White Fife. Gehun was a mixture of very early varieties obtained from India). Kernels hard, red, of about medium size, but a little longer as a rule than Red Fife. Heads beardless, tapering, rather long. Chaff yellowish, smooth. Straw stiff and rather long. Ripens a few days before Red Fife. Produces very strong flour of very good colour.

Colorado No. 50.—This wheat was produced at the Colorado State Agricultural Experiment Station, at Fort Collins, and is of rather complex pedigree, Fife and Indian varieties, however, predominating. It is entirely distinct from the wheat commonly called 'Colorado' in this country. The description of Colorado No. 50, as grown at Ottawa is as follows:—Kernels yellow, moderately hard, of about medium size. Heads of medium length, rather blunt and essentially beardless, though having a few short awns at the tip. Chaff yellowish, smooth. Straw short and stiff. Produces good flour.

Gatineau.—This variety, previously recorded as 8C, comes from a cross of Red Fife (female), with Goose (male), made by the writer in the year 1900. It is of special interest in several respects and though not promising for cultivation in rather moist climates, such as that of Ottawa, is worthy of careful test in some of the drier districts of Canada. Kernels hard, red, above medium size. Heads bearded, of medium or somewhat beyond medium length, rather narrow, tapering. Chaff yellowish, smooth. Straw long and not very strong when grown in good soil with an abundance of moisture. Ripens about with Red Fife wheat. Produces very strong flour which is of very good colour and rich in albuminoids.

Marquis.—This wheat is a selected, superior strain of the variety formerly grown at this farm under the name of 'Markham' Parentage, Hard Red Calcutta (female), crossed with Red Fife (male). Kernels rather dark red, hard, of about medium size, but rather short. Heads of medium length, beardless, pointed. Chaff yellowish, smooth. Straw stiff and of medium or rather below medium length. Ripens a few days before Red Fife. Produces very strong flour of very good colour.

Red Fife II.—This is a selected, early strain of Red Fife, which produces flour of remarkably high baking strength.

Stanley A.—This wheat is one of the most promising of all the strains selected from the various crosses of Ladoga. It yields flour which is superior to most of the others both in strength and in colour.

Yellow Cross.—This variety is a selection from an unfixed sort grown for some years under the name of 'Plumper.' Parentage, Colorado (female), crossed with Gehun (male). Kernels yellow, hard, about medium size. Heads bearded, pointed, below medium length. Chaff yellowish, downy. Straw stiff and rather short. Ripens quite early. This variety may prove useful for the making of rolled wheat as the kernels are rather unusually plump. The flour from this wheat showed only medium strength for bread-making when tested about six months after harvest, but when kept over for a year longer the strength was found to have improved so much that it ranked quite equal with Red Fife flour of the age of six months.

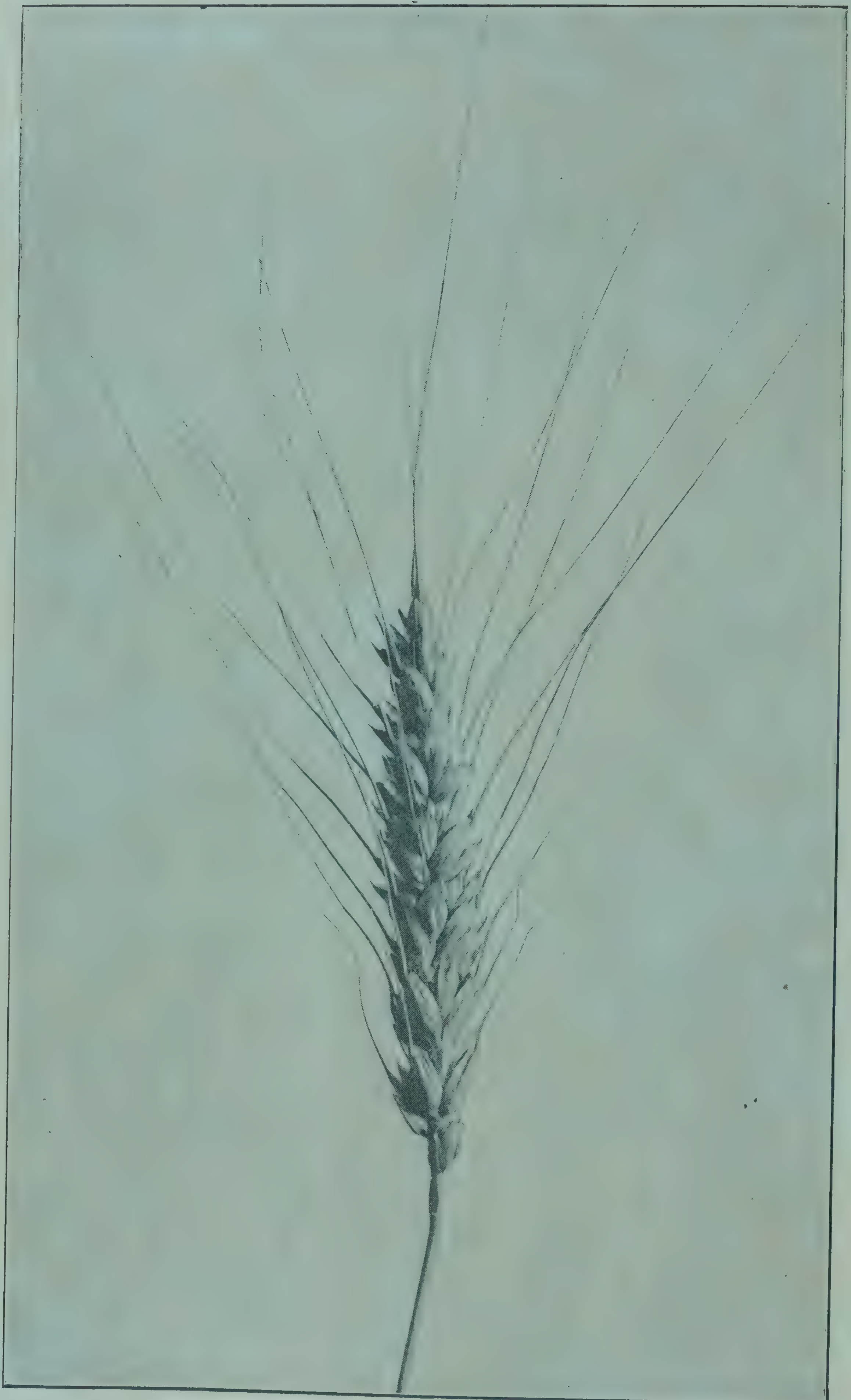
The test plots of wheat were sown on May 1 and 2, and were all one-fortieth of and acre in extent. The seed was used at the rate of 1½ bushels to the acre. The soil was a moderately heavy loam of good quality.

The yield per acre is expressed in pounds and also in 'bushels' of 60 pounds.

* Varieties and selected strains produced at the Central Experimental Farm are marked with an asterisk.

SPRING WHEAT—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Average length of Straw including head.	Character of Straw.	Average Length of Head.	Yield per Acre.	Yield per Acre.		Weight per measured bushel after cleaning.	RUSTED.
				Inches.		In.	Lbs.	Bush.	Lbs.	Lbs.	
1	Bishop*	Aug. 7	98	51	Medium	3	2,500	41	40	61	Slightly.
2	Ebert Selected*	" 2	93	45	Stiff	3	2,420	40	20	63	Considerably.
3	Colorado	" 8	99	51	Medium	2¾	2,400	40	..	61½	Slightly.
4	Aurora*	" 1	92	43	Stiff	3¼	2,320	38	40	61	Considerably.
5	Chelsea*	" 8	99	50	"	3½	2,300	38	20	59½	"
6	Hungarian White	" 9	100	49	Medium	3¼	2,260	37	40	61½	"
7	Huron Selected*	" 11	102	46	Stiff	3½	2,180	36	20	61	Slightly.
8	Bobs	" 8	99	46	"	3¼	2,180	36	20	61¼	Considerably.
9	Australian F.	" 11	102	48	Medium	3¼	2,180	36	20	57	Badly.
10	Preston A*	" 8	98	49	Stiff	3½	2,060	34	20	61	Slightly.
11	Percy A*	" 6	96	50	"	3¼	2,020	33	40	61	"
12	Pringle's Champlain	" 11	101	50	Medium	3½	2,020	33	40	60½	Badly.
13	Red Preston*	" 6	96	49	Stiff	3¼	2,020	33	40	59½	Slightly.
14	9 G*	" 9	99	49	Weak	2¼	2,020	33	40	57¾	Considerably.
15	Prospect E*	" 6	96	48	Stiff	3¼	1,980	33	..	57½	"
16	Herisson Bearded	" 8	99	52	"	1¾	1,960	32	40	63	Badly.
17	Laurel*	" 12	102	49	"	3½	1,940	32	20	58½	Considerably.
18	Riga M*	" 1	91	45	"	2½	1,940	32	20	60	Slightly.
19	Outlook*	" 11	101	50	"	4	1,920	32	..	59½	Badly.
20	Colorado No. 50.	" 12	103	42	"	3¼	1,900	31	40	58½	"
21	Marquis*	" 9	99	45	"	3¼	1,860	31	..	61	"
22	Red Fife H*	" 12	102	47	"	3¼	1,780	29	40	60	Slightly.
23	White Russian	" 13	103	49	"	3¼	1,780	29	40	60	Considerably.
24	Stanley A*	" 11	101	49	"	3¼	1,740	29	..	57½	Badly.
25	Alpha Selected*	" 9	100	50	Medium	3½	1,700	28	20	56	"
26	Persian Black	" 4	94	44	"	2½	1,700	28	20	57	Considerably.
27	Yellow Cross*	" 6	96	44	Stiff,	2½	1,700	28	20	63¼	Slightly.
28	10 F*	" 9	99	48	Weak	2½	1,680	28	..	56½	Considerably.
29	Blue Stem	" 13	104	52	"	3½	1,660	27	40	55	"
30	White Fife	" 13	103	47	Stiff	3¼	1,540	25	40	60½	"
31	Yellow Fife*	" 1	91	44	"	3½	1,540	25	40	58½	Slightly.
32	Haynes' Blue Stem (Minn. 169)	" 13	104	48	"	3½	1,500	25	..	57½	"
33	Red Fern	" 12	102	53	Medium	3¾	1,480	24	40	60	Considerably.
34	Spence Yellow*	" 1	91	48	Stiff	2½	1,460	24	20	63¾	"
35	Yellow Queen*	" 7	97	46	"	3	1,400	23	20	61	"
36	Marvel	" 14	104	49	Weak	3¾	1,380	23	..	49¾	"
37	Gatineau*	" 13	103	52	"	3¼	1,320	22	..	58¾	"



HEAD OF TURKEY RED WINTER WHEAT, NATURAL SIZE.

Most Productive Varieties of Spring Wheat.—Excluding the durum wheats, which are considered separately, the following varieties of wheat have shown unusual productiveness for a series of years on this farm:—Preston, Pringle's Champlain, Huron, Herisson Bearded and Bishop. The first four of these are red wheats with bearded heads. Bishop is a white wheat and is beardless. Of the five varieties, Pringle's Champlain is probably the best for the production of strong flour.

Somewhat lower in yield, but superior in the strength of their flour, are Red Fern (bearded), Red Fife (beardless), and White Fife (beardless).

Earliest Varieties of Spring Wheat.—Several very early varieties of spring wheat are being grown on this farm, but they are not at present being distributed or recommended for general cultivation. Farmers applying for very early sorts should remember that extreme earliness is frequently associated with a rather small yield, short straw, liability to rust or some other defect to which the more vigorous wheats are less subject.

The earliest wheats which are as yet included in the regular distribution of seed grain from this farm are Pringle's Champlain, Preston, Huron, Stanley and Percy. These are all somewhat earlier than Red Fife. Stanley and Percy are beardless sorts.

DURUM OR MACARONI WHEAT.

The term 'Macaroni' wheat is often employed to designate those varieties having very large, hard kernels of which 'Goose' or 'Wild Goose' is the best known example in Canada. As these wheats are not all suitable for the making of macaroni it is perhaps better to employ the term 'Durum' (meaning *hard*) which is used in many countries and is both accurate and scientific. The different sorts of durum wheat are by no means identical in quality, though they are usually considered to be so. Excellent bread can be made from some of them, but the extreme hardness of the kernels and the somewhat unusual qualities of the flour produced make the wheats of this class unpopular at present, with both millers and bakers. Farmers who grow any of the durum wheats should exercise great care to prevent them from becoming mixed with wheat which is to be sold for flour-making.

As a rule, these varieties suffer less from drought and from rust than other sorts. They may therefore, in some cases, be grown to advantage, especially in any rather dry district where rust is apt to be severe. They are not, however, to be generally recommended for damp climates. It should also be borne in mind that the market price of durum wheat is usually lower than that paid for varieties which are popular for milling purposes.

The plots of durum wheat were one-fortieth of an acre in extent. The seed was sown on April 27, at the rate of 1¾ bushels to the acre. The soil was a rather sandy loam.

The yield per acre is expressed in pounds and also in 'bushels' of 60 pounds.

Durum or Macaroni Wheat—Test of Varieties.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Average Length of Straw, including Head.	Character of Straw.	Average Length of Head.	Yield per Acre.	Yield per Acre.		Weight per measured bushel after cleaning.	Rusted.
				In.		In.	Lbs.	Bush.	Lbs.	Lbs.	
1	Roumanian	Aug. 9	104	55	Stiff	2¾	2,460	41	..	63	Slightly.
2	Gharnovka	" 9	104	54	"	2½	2,400	40	..	63	"
3	Goose	" 6	101	50	"	2¼	2,340	39	..	63	"
4	Beloturka	" 8	103	56	"	2¼	2,200	36	40	62½	"
5	Kahla	" 9	104	50	Weak	2½	2,000	33	20	60	Considerably
6	Kubanka	" 11	106	45	Stiff	2¼	1,980	33	..	62	"
7	Yellow Gharnovka	" 11	106	51	Weak	2¾	1,900	31	40	62	Slightly,
8	Black Don	" 7	102	51	Medium	2½	1,860	31	..	61	Badly.
9	Italian	" 20	115	47	Stiff	2¾	1,700	28	20	57½	Slightly.
10	Red Indian	" 7	102	49	"	3	1,620	27	.	59	"
11	Mahmoudi	" 14	109	46	"	2½	1,120	18	40	59	Badly.
12	Velvet Don	" 7	102	45	Medium	2¾	1,080	18	..	61	"

Roumanian which stands at the head of the list this year, has also given the heighest average yield during the past five years.

WINTER WHEAT.

The winter wheat was sown on August 29, 1905. The plots were one-fortieth of an acre in extent, and the seed was used at the rate of 1¾ bushels to the acre. The soil was a clay loam.

The young plants made good growth in the autumn, but the rather mild and very changeable weather during the winter killed the majority of them, on nearly all the plots, so that it was necessary when spring came to plough up the greater part of the land devoted to these experiments. Only one variety, Padi, withstood in a satisfactory manner the trying conditions of the winter. This variety ripened on July 23, and yielded at the rate of 2,440 lbs. (40 bushels 40 lbs.) per acre. Unfortunately this wheat cannot be recommended for general cultivation for flour-making purposes on account of the very poor and unattractive colour of the bread which is produced from it.

WINTER WHEAT IN ALBERTA.

It seems necessary to call the attention of wheat-growers in Alberta to the fact that the high reputation of Alberta winter wheat has been gained largely because the variety known as Turkey Red has been most extensively grown. Turkey Red produces stronger flour than most of the other red winter wheats and it will be impossible to keep up the quality of Alberta winter wheat if all the red varieties are regarded as equally desirable. Unfortunately the term Alberta Red is now often used as if it were the name of a variety, whereas it is only the designation of a grade and, according to the law, any red winter wheat grown in Alberta is Alberta Red, (unless it be a very poor sample). Appearances in wheat are often extremely deceptive, and a fine, hard red sample of winter wheat may not produce flour of good baking strength if the variety (or breed) of the wheat is poor. Hardness and colour alone, are no guarantee of flour strength.

Wheat growers in Alberta are therefore strongly advised to sow only pure Turkey Red when they wish to produce hard red wheat of the best strength. To aid in discriminating between the true Turkey Red and other red winter wheats a description of this variety is here given.

Turkey Red (Turkish Red).—The terms 'Alberta Red' and 'Kansas Red' are general, commercial terms for red winter wheat. Wheat sold under either of these names may or may not be Turkey Red. Kernels red, usually hard, about medium size, but somewhat long. Heads bearded, tapering, not broad, not above medium length. Chaff yellowish, smooth. Straw stiff and of about medium length. Produces flour of very good colour and very high strength.

The annexed plate shows a typical head (natural size) of Turkey Red winter wheat.

EMMER AND SPELT.

The plots of emmer and spelt were one-fortieth of an acre each. The grain was sown on April 28 and May 2, at the rate of about 120 lbs. (or four bushels by measure) to the acre. The soil was a rather light loam.

The varieties 9 J 3 and 9 K 2, which appear in the list this year for the first time are crosses between Common Emmer and Colorado wheat, in which the Emmer characteristics predominate somewhat.

Emmer and Spelt—Test of Varieties.

Number.	Name of Variety.	Date of Ripening.		No. of Days Maturing.	Average Length of Straw, including Head.	Character of Straw.	Average Length of Head.	Yield per Acre.	Weight per measured bushel after cleaning.	Rusted.
					In.		In.	Lbs.	Lbs.	
1	Common Emmer	Aug.	6	100	40	Weak	1¾	2,720	36	Slightly.
2	Red Emmer	"	9	103	47	"	3	2,680	32	"
3	Double Emmer	"	6	100	45	"	1¾	2,540	29	"
4	9 J 3	"	5	95	49	Stiff	2¾	2,220	36½	"
5	Red Spelt	"	14	108	53	"	4⅓	2,100	25	"
6	Smooth Spelt	"	15	109	44	"	4¾	1,800	25½	"
7	White Spelt	"	14	108	51	"	5	1,740	21½	Considerably.
8	White Emmer	"	15	109	49	Medium	3¼	1,500	24	Slightly.
9	Thick Emmer	"	15	109	40	Weak	2¼	1,400	28	Badly.
10	White Bearded Spelt	"	14	108	43	Stiff	4¾	1,200	23½	Considerably.
11	9 K 2	"	11	105	33	Medium	1¾	600	27	"

OATS.

The following varieties were added to the plots this season:—

Bergs.—A black oat obtained from Mr. C. Boije, of Finland. It has compact heads and ripens rather early.

Early Ripe.—A small, very early oat obtained from Prof. C. A. Zavitz, of Guelph, Ont. Chiefly white, but containing some yellow oats as well.

Sixty Day.—A small, very early oat obtained from Vermont. This oat is a mixture of at least two varieties, one being white and the other yellow. Selections have been made and are being propagated. While the name 'Sixty Day' is distinctly misleading, this oat seems to be the earliest ever grown at this farm.

White Wonder.—This variety which was grown for some years and then rejected from the plots has been re-introduced. It does not give a large yield but is rather early in ripening. The oats are white, short and small.

Several varieties have been dropped from the list. Among these may be mentioned especially, Holstein Prolific and Uberfluss. These are both productive sorts, but have the disadvantage of being mixtures of white and yellow oats; while at the same time they are not more productive than some of the pure varieties of white oats which are being grown here.

The name of the variety formerly recorded as Virginia White Abundance has been shortened to 'Virginia White.'

The plots were one-fortieth of an acre, and were sown on May 4th, the seed being used at the rate of two bushels per acre for most varieties, but in somewhat greater quantity whenever the oats were of unusually large size. The soil was a light loam.

The yield per acre is expressed in pounds and also in 'bushels' of 34 pounds.

* Varieties and selected strains produced at the Central Experimental Farm are marked with an asterisk.

OATS—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Average Length of Straw including Head.	Character of Straw.	Average Length of Head.	Yield per Acre.	Yield per Acre.		Weight per measured bushel after cleaning.	Rusted.
				In.		In.	Lbs.	Bush.	Lbs.	Lbs.	
1	Gold Rain	Aug. 7	95	51	Medium	7½	2.540	74	24	34½	Considerably.
2	Thousand Dollar	″ 8	96	51	Weak	8	2,520	74	4	33	″
3	Fichtel Mountain	″ 7	95	49	″	7½	2,420	71	6	32	″
4	Irish Victor	″ 14	102	56	″	8¾	2,400	70	20	28½	″
5	Joanette (black)	″ 17	105	42	″	7½	2,400	70	20	30½	Badly.
6	Golden Beauty	″ 8	96	42	Medium	7¼	2,340	68	28	30	Considerably.
7	Banner A*	″ 12	100	46	Stiff	7	2,320	68	8	31	Slightly.
8	Twentieth Century	″ 7	95	49	Weak	8	2,320	68	8	32½	Considerably.
9	Lincoln	″ 8	96	44	Stiff	7½	2,320	68	8	33	Slightly.
10	Daubeney Selected*	July 30	87	45	″	6½	2,320	68	8	33	Considerably.
11	Welcome	Aug. 7	95	42	″	8	2,300	67	22	33	Slightly.
12	American Beauty	″ 7	95	42	Medium	7	2,300	67	22	34¼	Considerably.
13	Mennonite	″ 8	96	44	Weak	7½	2,260	66	16	29¾	″
14	Sixty Day	July 24	81	39	Medium	5½	2,260	66	16	28½	Slightly.
15	Columbus Selected*	Aug. 4	92	47	Weak	7	2,200	64	24	32	Badly.
16	Excelsior (black)	″ 8	96	48	Medium	7¼	2.200	64	24	33½	″
17	Wide Awake	″ 6	94	44	Weak	7½	2,180	64	4	30	Considerably.
18	White Giant Selected	″ 7	95	42	Stiff	8	2,180	64	4	31½	Slightly.
19	Bavarian	″ 12	100	47	Medium	7¼	2,180	64	4	32	″
20	Improved Ligowo	″ 8	96	49	Weak	7¼	2,160	63	18	33½	Considerably.
21	Tartar King	″ 7	95	45	Stiff	8½	2,140	62	32	33	″
22	Atlantic	″ 7	95	46	Weak	7½	2,100	61	26	38	″
23	Danish Island	″ 7	95	44	Stiff	8	2,100	61	26	33½	Slightly.
24	Sorgenfrei	″ 6	94	46	Weak	7½	2,080	61	6	33	Considerably.
25	Kirsche	″ 6	94	41	″	7	2,080	61	6	30	″
26	Siberian	″ 8	96	47	Medium	8	2,080	61	6	32¼	″
27	Kendal White*	″ 7	95	45	″	7½	2,060	60	20	30½	″
28	Golden Fleece	″ 8	96	46	Stiff	6¾	2,060	60	20	31½	″
29	Black Beauty	″ 8	96	48	Weak	8½	2,060	60	20	29	Badly.
30	Tlola (black)	July 30	87	48	″	8	2,040	60	..	28¼	Considerably.
31	Green Russian	Aug. 11	99	46	″	7¾	2,040	60	..	30	Badly.
32	Banner B*	″ 12	100	46	Stiff	7	2,020	59	14	32	Slightly.
33	Garton's Abundance	″ 8	96	45	Weak	8¼	2,000	58	28	34	Considerably.
34	White Wonder	″ 1	89	46	″	8½	2,000	58	28	36	″
35	Kendal Black*	″ 14	102	48	″	8¼	2,000	58	28	30	Badly.
36	Swedish Select	″ 6	94	48	″	7¼	1,980	58	8	32	Considerably.
37	Goldfinder	″ 8	96	41	″	7¾	1,980	58	8	30½	Slightly.
38	Buckbee's Illinois	″ 8	96	49	″	7¾	1,940	57	2	32	Considerably.
39	Pioneer (black)	″ 8	96	46	Stiff	8½	1,940	57	2	31¾	″
40	Dinauer	″ 7	95	47	″	8¼	1,920	56	16	31½	″
41	Milford White*	″ 8	96	46	Weak	7¼	1,920	56	16	32	″
42	Improved American	″ 8	96	47	Medium	8	1,900	55	30	30	″
43	American Triumph	″ 7	95	42	″	7½	1,860	54	24	34½	″
44	Sensation	″ 7	95	46	″	8	1,860	54	24	33½	Slightly.
45	Bergs (black)	″ 7	95	45	Weak	7	1,840	54	4	36¼	Considerably.
46	Olive Black*	″ 8	96	44	Medium	8	1,840	54	4	32½	″
47	Waverley	″ 10	98	49	″	8	1,840	54	4	31	″
48	Golden Giant	″ 14	102	47	Stiff	8	1,780	52	12	27½	Badly.
49	Whiting	″ 10	98	48	Medium	7¾	1,780	52	12	33	Considerably.
50	Early Ripe	July 30	87	44	Stiff	6½	1,780	52	12	27½	″
51	Abundance	Aug. 7	95	45	Medium	8¼	1,740	51	6	32½	″
52	Virginia White	″ 10	98	45	Weak	6½	1,700	50	..	30	Badly.
53	Milford Black*	″ 10	98	46	″	7¼	1,660	48	28	30	″
54	Colossal	″ 7	95	47	Medium	9½	1,620	47	22	33	Considerably.
55	Bell (black)	″ 12	100	50	″	7½	1,600	47	2	32	″
56	Swedish Ligowo	″ 8	96	36	Weak	6	1,540	45	10	33	″
57	Chinese Naked	″ 8	96	48	″	7¼	1,520	44	24	46½	″
58	Early Angus	″ 13	101	44	″	7	1,180	34	24	33½	Badly.
59	Storm King	″ 8	96	46	Stiff	8½	920	27	2	34¼	Considerably

Most Productive Varieties of Oats.

Among the most productive varieties of oats grown for the past five years at this farm the following varieties deserve special mention:—Banner (sometimes called 'American Banner'), Twentieth Century, White Giant and Lincoln. These are all white oats, and one or more of these kinds can be obtained from any good seedsman. Golden Beauty, Columbus and Mennonite are very productive yellow oats, but do not seem to possess any points of superiority over the best white oats. Among the black oats two of the best sorts are Black Beauty and Joanette. These are, however, usually less productive than the best white kinds. The Joanette has short straw, which makes it a desirable variety to sow in some cases. It is readily obtainable in commerce, sometimes under its own name and at other times under the designation 'Black Goanette.'

Earliest Varieties of Oats.—The variety known as 'Sixty Day' is perhaps the earliest oat ever grown at this farm. It was ready to cut, last season, in 81 days from the time of sowing. Somewhat less early but probably more productive, as a rule, are Tartar King, Welcome and Daubeney. These are all white oats (except the Sixty Day, which is a mixture of white and yellow) and give a fair crop. They are obtainable in commerce, but farmers are not advised to grow them except in cases where earliness is of very great importance. The white oats mentioned in the preceding paragraph will generally be found more profitable.

SIX-ROW BARLEY.

The *Manchurian* barley added to the plots this year is a selected strain obtained from Mensury.

Small Blue Naked is a bearded, hulless variety the kernels of which would be described as 'white' rather than 'blue.' It is not a promising sort.

Taganrog is a variety of Russian origin.

Owing to some inequality in the soil, the plot of Odessa barley was almost a failure this year and is therefore omitted from the list.

The plots were all one-fortieth of an acre. The seed was sown on April 28th at the rate of 1¾ bushels per acre. The soil was a loam of fair quality, but variable in character.

The yield per acre is expressed in pounds and also in 'bushels' of 48 pounds.

* Varieties and selected strains produced at the Central Experimental Farm are marked with an asterisk.

SIX-ROW BARLEY—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Average Length of Straw, including head.	Character of Straw.	Average Length of Head.	Yield per Acre.	Yield per Acre.		Weight per measured bushel after cleaning.	Rusted.
				In.		In.	Lbs.	Bush.	Lbs.	Lbs.	
1	Albert*..	July 30	93	43	Weak.....	2¼	3,700	77	4	47¾	Slightly.
2	Black Japan.........	" 28	91	33	Stiff.....	2	3,500	72	44	47½	Considerably.
3	Mandscheuri.........	" 30	93	47	Medium..	3	3,360	70	..	48¼	Slightly.
4	Trooper*.............	" 23	86	43	Stiff	3¼	3,320	69	8	45½	"
5	Taganrog....	" 31	94	37	Weak.....	2¾	3,320	69	8	49	Considerably.
6	Mensury	" 28	91	48	Stiff......	3¼	3,220	67	4	48	Slightly.
7	Escourgeon.....	" 31	94	42	Weak.....	3¼	3,140	65	20	51	"
8	Nugent*..	" 30	93	47	Medium..	3¼	3,120	65	..	46	"
9	Sisolsk........ ...	" 29	92	46	" ..	3½	3,100	64	28	45	"
10	Manchurian*..........	" 28	91	49	" ..	3¼	3,040	63	16	45½	"
11	Bere	" 25	88	40	" ..	3¼	3,040	63	16	45½	"
12	Empire*..............	" 31	94	47	Weak.....	3	3,000	62	24	47½	Considerably.
13	Argyle*	" 30	93	47	Medium..	3	2,980	62	4	48	Slightly.
14	Blue Long Head...	" 31	94	36	" ..	3	2,960	61	32	40½	Considerably.
15	Yale*.......	" 31	94	48	Stiff......	2¾	2,800	58	16	47½	Slightly.
16	Mansfield*......... ...	" 31	94	49	"	2¼	2,780	57	44	48	"
17	Eclipse...............	" 31	94	46	Medium..	3¼	2,640	55	..	45	Considerably.
18	Common	" 30	93	38	Weak.....	2¾	2,580	53	36	48	"
19	Summit*.............	" 30	93	48	Stiff......	3¼	2,480	51	32	45½	Slightly.
20	Claude*.......	Aug. 2	96	43	Weak.....	2¼	2,460	51	12	47	Considerably.
21	Hulless Black.........	July 23	86	30	"	2¼	2,420	50	20	60½	"
22	Stella*	Aug. 1	95	48	"	3¼	2,260	47	4	43½	Slightly.
23	Oderbruch............	" 3	97	41	Medium..	3¼	2,040	42	24	43	"
24	Brome*.	" 3	97	41	Weak.....	3	2,040	42	24	46	"
25	Royal*...............	" 1	95	47	Stiff......	3¼	2,000	41	32	41¼	"
26	Small Blue Naked ...	" 3	97	36	Weak.....	2¾	1,660	34	28	52½	Considerably.
27	Champion (beardless)..	July 30	93	43	"	3	1,560	32	24	31	"

Most Productive Varieties of Six-Row Barley.—Among the most productive sorts which have been tested for several years at this farm are Mensury, Odessa, Nugent, Trooper and Blue Long Head. Mensury is obtainable from most seedsmen, and small samples of Odessa are usually available for distribution from this farm to any farmers who apply early in the winter.

Earliest Varieties of Six-Row Barley.—The differences in earliness among the varieties of six-row barley are not very striking. Among the earliest sorts are Mensury and Odessa.

Beardless Six-Row Barley.—Champion is the best variety of beardless barley that has been grown here. It ripens early, but gives a poor yield and is not to be recommended. It is obtainable in commerce.

Hulless Six-Row Barley.—The most productive variety of hulless barley which has been tested at this farm is Hulless Black. This is a bearded sort and can be obtained in commerce. It ripens early, but has weak straw and gives a small yield.

TWO-ROW BARLEY.

Erfurt White, Gambrinus, Hofbrau and *Jewel* are varieties recently obtained from Germany.

Old Irish was obtained from Ireland.

The plots of two-row barley were sown on April 30th and May 1st, the seed being used at the rate of two bushels to the acre. The soil was a loam of fair quality but not of uniform character.

The yield per acre is expressed in pounds and also in 'bushels' of 48 pounds.

* Varieties and selected strains produced at the Central Experimental Farm are marked with an asterisk.

Two-row Barley—Test of Varieties.

Number.	Name of Variety.	Date of Ripening.		No. of Days Maturing.	Average Length of Straw, including head.	Character of Straw.	Average Length of Head.	Yield per Acre.	Yield per Acre.		Weight per measured bushel after cleaning.	Rusted.
					In.		In.	Lbs.	Bush.	Lbs.	Lbs.	
1	Hannchen	July	31	92	40	Medium	3½	3,600	75	..	51½	Slightly.
2	Standwell	"	31	92	48	"	3½	3,260	67	44	47	"
3	Erfurt White	"	30	90	38	Weak	3½	3,200	66	32	44¼	"
4	Swan's Neck	"	31	92	39	"	2¾	3,020	62	44	49	Considerably.
5	Invincible	Aug.	1	93	49	"	3	3,000	62	24	48½	Slightly.
6	Old Irish	July	31	91	48	Stiff	3½	2,860	59	28	49	"
7	Jewel	Aug.	3	95	41	Weak	3¼	2,820	58	36	47	"
8	French Chevalier	"	3	95	53	Medium	3¾	2,780	57	44	48½	"
9	Beaver*	July	31	92	48	"	4½	2,760	57	24	48	"
10	Jarvis*	Aug.	1	93	57	Stiff	4	2,740	57	4	50	"
11	Princess Svalof	"	6	98	38	Weak	3¼	2,740	57	4	46	Considerably.
12	Gordon*	"	1	93	53	Medium	2¾	2,720	56	32	50	Slightly.
13	Canadian Thorpe	"	3	95	45	Weak	2¾	2,700	56	12	46	"
14	Swedish Chevalier	"	3	95	42	"	3¾	2,700	56	12	47	"
15	Brewer's Favourite	"	6	98	45	"	3	2,640	55	..	47	Considerably.
16	Clifford*	"	2	94	54	Stiff	3¾	2,620	54	28	48½	Slightly.
17	Dunham*	"	2	94	52	Medium	3¾	2,580	53	36	48	Considerably
18	Sidney*	"	1	93	48	Stiff	3¼	2,540	52	44	50	"
19	Danish Chevalier	"	2	94	51	"	4¼	2,540	52	44	46¼	Slightly.
20	Fichtel Mountain	"	2	94	44	Medium	3½	2,540	52	44	49¼	"
21	Archer Chevalier	"	6	98	35	Weak	3¾	2,520	52	24	46½	Considerably.
22	Harvey*	"	1	93	52	Stiff	3¾	2,340	48	36	50¼	Slightly.
23	Hofbrau	July	31	91	41	Weak	4¼	2,340	48	36	46	"
24	Maltster	Aug.	6	98	46	"	2¾	2,240	46	32	44	Considerably.
25	Primus	"	2	94	50	"	3	2,160	45	..	47	Slightly.
26	Gambrinus	"	5	96	38	"	4	2,120	44	8	46	Considerably.
27	Logan*	"	1	93	56	Stiff	3½	2,060	42	44	49	"
28	Princess	"	3	95	40	Weak	4	1,940	40	20	46	Slightly.

Most Productive Varieties of Two-Row Barley.—Taking the average of the returns for the past five years, the varieties of two-row barley found to be the most productive on this farm are French Chevalier, Danish Chevalier, Canadian Thorpe, Princess Svalof and Standwell. The Chevalier barleys ripen somewhat earlier, as a rule, than the three other sorts in this list.

Earliest Varieties of Two-Row Barley.—The earliest sorts among those tested for not less than five years at this farm are Beaver and Jarvis. These ripen usually about two or three days before French Chevalier. They give good yields, but have not proved so productive as the best Chevalier barleys.

Beardless and Hulless Two-Row Barley.—The varieties of beardless and of hulless two-row barley which have been tested at this farm have not sufficient strength of straw to make them profitable sorts for farmers to cultivate.

WINTER SIX-ROW BARLEY.

A plot of winter barley of the variety known as Zero, was sown on August 29th, 1905. It made good growth in the autumn, but was entirely killed owing to the changeable weather during the winter.

PEAS.

The plots of peas were one-fortieth of an acre each. The soil was a sandy loam. The seed was sown on May 7th at the rate of two to three bushels per acre, according to the size of the pea. The crop obtained was considerably below the average owing to the insufficient rainfall during July and August.

The yield per acre is expressed in pounds and also in 'bushels' of 60 pounds.

* Varieties and selected strains produced at the Central Experimental Farm are marked with an asterisk.

PEAS.—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	Number of Days Maturing.	Character of Growth.	Average Length of Straw.	Average Length of Pod.	Yield per Acre.	Yield per Acre.		Weight per measured bushel after cleaning.	Size of Pea.
					In.	In.	Lbs.	Bu.	lbs.	Lbs.	
1	Chancellor..	Aug. 9	94	Strong....	68	2¼	2,080	34	40	62½	Small.
2	Arthur*..	" 9	91	" ...	61	2¼	1,980	33	..	62	Medium.
3	Early Britain...... ..	" 16	101	" ...	71	2¼	1,900	31	40	61	"
4	English Grey.........	" 16	101	"	73	2¼	1,880	31	20	62	"
5	Archer*	" 14	99	" ...	73	2	1,780	29	40	64	"
6	Canadian Beauty.....	" 13	98	" ...	71	2½	1,780	29	40	62	Large.
7	Field Grey.....	" 13	98	" ...	66	2	1,780	29	40	63	Small.
8	Pearl*.............. .	" 14	99	" ...	73	2¾	1,780	29	40	61	Large.
9	Golden Vine....... ...	" 14	99	" ...	73	2¼	1,700	28	20	64¼	Small.
10	Duke*..	" 14	99	" ...	73	2¼	1,700	28	20	62½	Large.
11	Agnes*.............	" 14	99	" ...	68	2½	1,660	27	40	63	"
12	Gregory*...........	" 16	101	" ...	71	2½	1,660	27	40	63¼	Medium.
13	Black-eye Marrowfat	" 16	101	" ...	73	2¾	1,620	27	..	62	Large.
14	Daniel O'Rourke	" 13	98	" ...	71	2½	1,620	27	..	63½	Small.
15	Picton*.....	" 13	98	" ...	66	2¼	1,620	27	..	62½	Large.
16	Prussian Blue.	" 7	92	" ...	68	2½	1,620	27	..	62¼	Medium.
17	Wisconsin Blue.......	" 11	96	" ...	58	2¼	1,600	26	40	62½	"
18	Kent*...	" 13	98	" ...	70	2⅓	1,500	25	..	61½	Large.
19	Mackay*	" 13	98	" ...	71	2½	1,500	25	..	62½	Medium.
20	Nelson*	" 7	92	" ...	53	2¼	1,480	24	40	62½	"
21	Paragon*....	" 7	92	" ...	63	2¼	1,480	24	40	62	"
22	Prince Albert	" 14	99	" ...	68	2¼	1,480	24	40	62½	Small.
23	Prince*.....	" 13	98	" ...	68	2¼	1,460	24	20	62¼	Large.
24	Victoria*.......	" 16	101	" ...	68	2	1,420	23	40	62	Medium.
25	White Marrowfat. ...	" 11	96	" ...	63	2½	1,300	21	40	62½	Large.

Most Productive Varieties of Peas.—Among the most productive sorts of peas grown for the past five years at this farm are Golden Vine, Canadian Beauty, Prussian Blue, Mackay and Chancellor. One or more of these varieties can be obtained from almost any seedsman.

Earliest Varieties of Peas.—Chancellor and Prussian Blue are among the earliest varieties, but Golden Vine and Canadian Beauty are almost as early.

SPRING RYE.

Two plots of one-fortieth acre each were sown on May 7th, the seed being used at the rate of 1½ bushels to the acre. The soil was a rather light loam.

The *Ottawa Select* rye is a new strain produced at this farm by selection.

The yield per acre is expressed in pounds and also in 'bushels' of 56 pounds.

SPRING RYE—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Average Length of Straw, including Head.	Character of Straw.	Length of Head.	Yield per Acre.	Yield per Acre.		Weight per measured bushel after cleaning.	Rusted.
				Inches.		Inches.	Lbs.	Bush.	Lbs.	Lbs.	
1	Common	Aug. 7	92	49	Stiff......	3	2,260	40	20	57	Slightly.
2	Ottawa Select........	" 7	92	49	"	3¼	2,200	39	16	56	"

WINTER RYE.

Three plots of winter rye were sown August 29th, 1905. The plots were one-fortieth of an acre, and the seed was used at the rate of 1½ bushels per acre. The rye made good growth in the autumn, but was somewhat injured by the unusual weather during the winter. It gave, however, a large crop of grain. The soil was a clay loam.

The variety called *Dominion* is a new strain produced at this farm by selection.

The yield per acre is expressed in pounds and also in 'bushels' of 56 pounds.

WINTER RYE—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No. of Days maturing.	Average Length of Straw, including Head.	Character of Straw.	Average Length of Head.	Yield per Acre.	Yield per Acre.		Weight per measured bushel after cleaning.	Rusted.
				Inches.		Inches.	Lbs.	Bush.	Lbs.	Lbs.	
1	Thousandfold	July 23	328	58	Stiff....	4⅓	2,720	48	32	58	Slightly.
2	Mammoth White....	" 23	328	61	"	4¾	2,460	43	52	59	"
3	Dominion	" 23	328	55	"	4½	2,440	43	32	59½	"

GRAIN SOWN IN DIFFERENT QUANTITIES PER ACRE ON SANDY LOAM.

These experiments were conducted on plots of one-fortieth of an acre each. All the grain was sown on May 7th. The wheat was ripe August 10th, the oats August 11th and the barley July 28th.

The results obtained this season are given in the following table.

Name of Variety.	Quantity Sown per Acre.	Number of Days from Sowing to Harvesting.	Yield per Acre.	
	Bush.		Bush.	lbs.
Preston Wheat	1	95	29	..
"	1¼	95	29	40
"	1½	95	32	20
"	2	95	33	40
"	2½	95	31	..
"	3	95	25	40
Banner Oats	1½	96	59	14
"	2	96	63	18
"	2½	96	48	28
"	3	96	52	12
"	3½	96	48	8
"	4	96	49	14
Mensury Barley	1½	82	72	4
"	2	82	70	20
"	2½	82	66	32
"	3	82	62	4
"	3½	82	63	16
"	4	82	57	24

These experiments have now been carried on for six years and, though the results obtained have been somewhat irregular, they show clearly that on sandy loam there is no gain in sowing more than about 1½ bushels per acre of Preston wheat. The tests with larger quantities of seed than this will therefore be discontinued.

With Banner oats the lowest average yields for six years have been obtained by sowing 1½ and 4 bushels per acre. These two rates of seeding will therefore be discontinued.

With Mensury barley the results obtained thus far have varied so much from season to season that no definite conclusions can yet be drawn.

PLOTS OF MIXED GRAIN.

In choosing the varieties for these plots the greatest care is exercised to sow together only such sorts as are known to mature in almost the same number of days, so that they may both be ready for cutting at the same time. Only one column is given for the number of days maturing, as in every case the mixtures ripened with great uniformity.

The plots were one-fortieth of an acre and the seed was sown on May 5th. Wheat was sown at the rate of 60 lbs. per acre, oats 40 lbs. per acre, barley 50 lbs. per acre and emmer 70 lbs. per acre. The soil was a sandy loam.

Varieties.	Date of Ripening.	Number of Days Maturing.	Yield per Acre.	Proportions in Crop Harvested.
			Lbs.	
Wheat and Oats : –				
Pringle's Champlain Wheat and American Triumph Oats	Aug. 11...	98	1,860	48 per cent wheat = 893 lbs. per acre. 52 " " oats = 967 " "
Preston Wheat and White Giant Oats	" 12..	99	1,320	73 per cent wheat = 964 " " 27 " " oats = 356 " "
Wheat and Two-row Barley : —				
Gehun Wheat and French Chevalier Barley	" 5..	92	2,020	19 per cent wheat = 384 " " 81 " " barley = 1,636 " "
Oats and Two-row Barley :—				
American Beauty Oats and Princess Svalof Barley	" 7..	94	2,520	65 per cent oats = 1,638 " " 35 " " barley = 882 " "
Welcome Oats and French Chevalier Barley	" 6..	93	2,300	30 per cent oats = 690 " " 70 " " barley = 1,610 " "
Oats and Emmer :—				
Banner Oats and Common Emmer....	" 14..	101	1,200	66 per cent oats = 792 " " 34 " " emmer = 408 " "

FIELD BEANS.

Four plots, one-fortieth of an acre each, were sown on May 21st. The soil was a sandy loam.

The yield per acre is expressed in pounds and also in 'bushels' of 60 pounds.

FIELD BEANS—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Average Length of Straw.	Average Length of Pod.	Yield per Acre.	Yield per Acre.		Weight per Measured Bushel after Cleaning.
				Inches.	Inches.	Lbs.	Bush.	Lbs.	Lbs.
1	Marrowfat..............	Aug. 20..	91	19	$3\frac{1}{4}$	1,620	27	..	63
2	White Field..........	" 20..	91	24	$4\frac{1}{4}$	1,600	26	40	63
3	Norwegian Brown.. ..	" 14..	85	15	$4\frac{3}{4}$	1,440	24	..	61
4	California Pea Bean...	" 20..	91	16	$3\frac{3}{4}$	1,280	21	20	$64\frac{1}{2}$

FLAX.

The plots of flax were one-fortieth of an acre. The seed was sown on May 21st at the rate of 60 lbs. to the acre. The soil was a sandy loam.

The yield per acre is expressed in pounds and also in 'bushels' of 56 pounds.

Flax- Varieties.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Average Length of Plants.	Yield per Acre.	Yield per Acre.		Weight per Measured Bushel after Cleaning.
				Inches.	Lbs.	Bush.	Lbs.	Lbs.
1	Novarossick	Aug. 17	88	29	1,020	18	12	55
2	Common	" 9	80	38	800	14	16	55½
3	La Plata	" 9	80	30	760	13	32	55
4	Russian	" 7	78	34	720	12	48	54½
5	Yellow Seed	" 7	78	31	720	12	48	54
6	Riga	" 7	78	35	640	11	24	54
7	White Flowering	" 7	78	26	640	11	24	55

FIELD ROOTS.

The advantage of late pulling for field roots having been clearly proved by the experience of several years, comparative tests, by pulling on two different dates about two weeks apart, have been discontinued. All the roots were harvested at the one time, but the harvesting was left until quite late so as to enable the roots to make as large a growth as possible.

The yield per acre of the field roots is calculated from the weight of the crop gathered from one-hundredth of an acre.

The soil on which the field roots were grown was a clay loam.

It is probable that in some instances varieties which are mentioned in these tables under different names are identical in all essential respects.

In Canada the ton contains 2,000 pounds.

TURNIPS.

Two sowings were made of each variety, the first on May 15th and the second on May 29th. The seed was used at the rate of about four pounds per acre. Before sowing, the land was made up in drills two feet apart and rolled with a heavy land roller, which flattened the drills nearly one-half, leaving a firm seed bed. When the young plants were about three inches high they were thinned out, leaving them about seven inches apart in the rows.

The roots were pulled on October 24th.

TURNIPS—VARIETIES.

Number.	Name of Variety.	Yield per Acre from 1st Sowing.		Yield per Acre from 2nd Sowing.	
		Tons.	Lbs.	Tons.	Lbs.
1	New Century	22	300	14	250
2	Perfection Swede	21	300	15	800
3	Mammoth Clyde	19	600	13	1,500
4	Selected Purple Top	19	300	15	1,150
5	Skirvings	18	800	13	1,100
6	Sutton's Champion	17	1,000	15	1,000
7	Imperial Swede	17	500	13	100
8	Hall's Westbury	16	1,650	12	1,100
9	Jumbo	16	150	12	1,500
10	Kangaroo	15	1,700	11	950
11	Hartley's Bronze	15	1,500	12	400
12	Halewood's Bronze Top	15	1,150	10	1,950
13	Magnum Bonum	15	850	11	1,600
14	Carter's Elephant	14	100	8	1,550
15	Elephant's Master	14	50	9	1,650
16	Good Luck	13	1,550	10	1,900
17	Emperor Swede	12	1,950	10	1,800
18	Bangholm Selected	11	1,800	8	450
19	East Lothian	11	....	8	1,350
20	Drummond Purple Top	10	1,550	7	1,200

The average yield from the 1st sowing was 15 tons 1,890 lbs. per acre.
The average yield from the 2nd sowing was 11 tons 1,765 lbs. per acre.

MANGELS.

Two sowings were made of each variety, the first on May 15th, and the second on May 29th. The seed was used at the rate of about six pounds per acre. Before sowing, the land was made up in drills two feet apart and rolled with a heavy land roller to make a firm seed bed. When the young plants were about three inches high they were thinned out, leaving them about seven inches apart in the rows. The roots were pulled October 24th.

MANGELS—TEST OF VARIETIES.

Number.	Name of Variety.	Yield per acre from 1st Sowing.		Yield per acre from 2nd Sowing.	
		Tons.	Lbs.	Tons.	Lbs.
1	Selected Mammoth Long Red	40	1,550	28	1,000
2	Mammoth Long Red	38	800	25	600
3	Yellow Intermediate	37	1,050	31	700
4	Triumph Yellow Globe	36	700	24	1,450
5	Prize Mammoth Long Red	35	600	24	650
6	Selected Yellow Globe	34	900	25	1,650
7	Mammoth Yellow Intermediate	33	800	26	1,900
8	Prize Winner Yellow Globe	33	200	23	1,400
9	Lion Yellow Intermediate	32	300	24	1,800
10	Giant Sugar Mangel	30	1,600	23	1,550
11	Giant Yellow Intermediate	29	1,250	28	700
12	Leviathan Long Red	28	400	27	200
13	Half Sugar Rosy	27	700	27	1,200
14	Half Sugar White	25	700	32	500
15	Gate Post	24	1,500	24	1,500
16	Giant Yellow Globe	21	50	20	1,850

The average yield from the first sowing was 31 tons 1,569 lbs. per acre.
The average yield from the second sowing was 26 tons 541 lbs. per acre.

CARROTS.

Two sowings were made of each variety, the first on May 15th, and the second on May 29th. The seed was used at the rate of about six pounds per acre. Before sowing, the land was made up in drills two feet apart and rolled with a heavy land roller to make a firm seed bed. When the young plants were about three inches high they were thinned out, leaving them about five inches apart in the rows. The roots were pulled October 25th.

CARROTS—TEST OF VARIETIES.

Number.	Name of Variety.	Yield per acre from 1st Sowing.		Yield per acre from 2nd Sowing.	
		Tons.	Lbs.	Tons.	Lbs.
1	Mammoth White Intermediate	25	1,950	31	500
2	Improved Short White	25	1,200	28	700
3	Ontario Champion	21	1,000	21	1,950
4	Giant White Vosges	21	900	28	1,200
5	Long Yellow Stump-rooted	20	1,300	25	1,000
6	New White Intermediate	20	900	27	1,000
7	Carter's Orange Giant	16	1,600	21	1,850
8	White Belgian	15	1,200	17	100
9	Early Gem	15	800	23	50
10	Half Long Chantenay	14	1,200	23	1,500

The average yield from the 1st sowing was 19 tons 1,605 lbs. per acre.
The average yield from the 2nd sowing was 24 tons 1,875 lbs. per acre.

SUGAR BEETS.

Two sowings were made of each variety, the first on May 15th, and the second on May 29th. The seed was used at the rate of about six pounds per acre. Before sowing, the land was made up in drills two feet apart and rolled with a heavy land roller to make a firm seed bed. When the young plants were about three inches high they were thinned out, leaving them about five inches apart in the rows. The roots were pulled on October 25th.

Though all the varieties mentioned here are commonly classed as sugar beets, it should be noted that the only ones recommended for use in the manufacture of sugar are Wanzleben, French Very Rich, and Vilmorin's Improved.

SUGAR BEETS—TEST OF VARIETIES.

Number.	Name of Variety.	Yield per acre from 1st Sowing.		Yield per acre from 2nd Sowing.	
		Tons.	Lbs.	Tons.	Lbs.
1	Danish Red Top	35	50	27	1,550
2	Improved Imperial	34	150	30	500
3	Red Top Sugar	33	350	29	..
4	Danish Improved	31	1,950	27	450
5	Royal Giant	31	1,350	24	600
6	French Very Rich	28	300	26	100
7	Wanzleben	26	1,700	23	..
8	Vilmorin's Improved	25	800	21	1,300

The average yield from the first sowing was 30 tons 1,581 lbs. per acre.
The average yield from the second sowing was 26 tons 313 lbs. per acre.

INDIAN CORN.

The corn was sown with the seed drill in rows thirty-five inches apart, and was also sown in hills thirty-five inches apart each way. When the plants were about six inches high they were thinned out, leaving them from six to eight inches apart in the rows, and leaving four or five plants in each hill. The seed was sown May 28th, and the corn was cut green for ensilage September 11th. The yield has been calculated from the weight of crop cut from two rows, each 66 feet long. The soil was a clay loam.

For the making of ensilage the corn should be cut when the kernels are in the late milk or doughy stage; but the summer at Ottawa is not always warm enough to bring the later varieties to this state of maturity before it is necessary to cut the crop to avoid frost.

In Canada the ton contains 2,000 pounds.

INDIAN CORN—TEST OF VARIETIES.

Number.	Name of Variety.	Character of Growth.	Height.	Leafiness.	Condition when Cut.	Weight per Acre grown in Rows.		Weight per Acre grown in Hills.	
			Inches.			Tons.	Lbs.	Tons.	Lbs.
1	Wood's Northern White Dent	Medium	70 to 75	Leafy	Early milk	15	690	12	1,960
2	Early Mastodon	"	70 " 75	"	"	14	1.920	16	450
3	Early Butler	"	70 " 75	"	"	14	1,590	15	1,900
4	Selected Leaming	"	65 " 70	"	Late milk	14	50	14	50
5	Red Cob Ensilage	Fairly strong	75 " 80	"	Very few cobs.	13	1,940	14	1,480
6	Mammoth Cuban	"	70 " 75	"	Early milk	13	1,720	13	400
7	Early Leaming	Medium	65 " 70	"	Late milk	13	950	11	990
8	Giant Prolific Ensilage	Fairly strong	70 " 75	"	Early milk	13	840	13	1,500
9	Superior Fodder	Strong	75 " 80	Very leafy	Few cobs	13	730	15	270
10	Thoroughbred White Flint.	Medium	60 " 65	Leafy	Early milk	12	1,740	15	1,240
11	Longfellow.	"	60 " 65	Medium	Doughy	12	310	10	350
12	Compton's Early	Fairly strong	55 " 60	"	"	11	1,320	12	290
13	Evergreen Sugar	Medium	55 " 60	Leafy	Early milk	11	1,210	12	970
14	King Philip	"	60 " 65	Medium	Doughy	11	110	9	1,360
15	Eureka	Very strong	80 " 85	Leafy	No cobs	11	..	16	560
16	Early Longfellow	Medium	60 " 65	Medium	Doughy	11	..	9	1,140
17	Champion White Pearl	"	70 " 75	Leafy	Early milk	10	1,450	13	1,060
18	North Dakota White	"	60 " 65	"	"	10	570	12	200
19	Salzer's All Gold	"	65 " 70	"	"	8	1,600	12	970
20	Cloud's Early Yellow	"	70 " 75	"	Late milk	8	1,160	13	1,170
21	Angel of Midnight	Short growth	55 " 60	"	Early milk	7	1,290	9	1,360
22	Pride of the North	Fairly strong	70 " 75	"	"	7	1,290	15	470
23	White Cap Yellow Dent	Short growth	60 " 65	"	"	7	190	11	1,100

The average yield from the rows was 11 tons 1,420 lbs. per acre.
The average yield from the hills was 13 tons 223 lbs. per acre.

INDIAN CORN SOWN AT DIFFERENT DISTANCES.

Three varieties were chosen for this test: Champion White Pearl, Selected Leaming, and Longfellow. The seed was sown May 28th, and the corn was cut for ensilage September 11th. Sixteen rows of each variety were sown, that is, four rows at each of the distances mentioned, and the yield per acre has been calculated from the weight of crop obtained from the two inner rows in each case. The length of the portions of the rows cut for weighing was 66 feet.

Name of Variety.	Distance between the Rows.	Character of Growth.	Height when Cut.	Condition when Cut.	Yield per Acre.	
	In.		In.		Tons.	Lbs.
Champion White Pearl	21	Very strong.	80—85	Early milk..	23	305
" "	28	Strong......	70—75	" ..	19	1,762
" "	35	" ..	70—75	" ..	13	1,390
" "	42	Very strong.	85—90	" ..	16	1,840
Selected Leaming	21	Strong.	65—70	" ..	19	367
"	28	" ..	65—70	" ..	17	404
"	35	" ..	65—70	" ..	9	920
"	42	" .	70—75	" ..	13	1,918
Longfellow	21	" ..	60—65	Late milk ..	16	1,075
"	28	" ..	60—65	" ..	14	1,469
"	35	Medium....	55—60	" ..	6	650
"	42	Strong.....	65—70	" ..	10	868

It will be seen that in every instance the largest yield per acre was obtained when the rows were closest together.

FIELD PLOTS OF POTATOES.

As the experimental plots of field roots and fodder corn do not occupy the whole of the field in which they are placed, the remaining space is usually filled with potatoes, such varieties being grown as are likely to be of service in the annual distribution of samples from this farm.

The area devoted to the different varieties varies considerably. This season most of the plots were from about one-half to one and one-half acres in area.

The potatoes were planted May 16th to 18th. The soil varied from a very sandy loam to a moderately heavy loam. On account of the dry weather in July and August the yield of potatoes was not large.

The yield per acre is expressed in pounds and also in 'bushels' of 60 pounds. The yield given includes only the sound potatoes. There was not much loss from rot this season.

Number.	Variety.	Time of Maturing.	Colour.	Yield per Acre.	Yield per Acre.
				Lbs.	Bushels.
1	Everett	Early	Pink........	15,540	259
2	Early White Prize	Very early.........	White......	14,340	239
3	Carman No. 1	Mid-season to late	"	12,120	202
4	Late Puritan	" "	"	11,580	193
5	Gold Coin	" "	"	10,380	173
6	Uncle Sam	" "	"	10,140	169
7	Money Maker	" "	"	9,900	165
8	Rochester Rose	Very early......	Pink......	9,360	156
9	Vick's Extra Early	Early............	Pink & white	8,100	135
10	Burpee's Extra Early	Very early..	White.....	7,740	129
11	Ashleaf Kidney	Mid-season to late	"	7,740	129
12	Bovee	Very early.... ...	Pink & white	7,320	122
13	Burnaby Mammoth	Mid-season to late	" "	7,260	121
14	Dooley	" "	White......	6,000	100

REPORT OF THE POULTRY MANAGER.

(A. G. Gilbert.)

Dr. Wm. Saunders, C.M.G.,
Director Dominion Experimental Farms,
Ottawa.

Sir,—I have the pleasure of submitting to you the nineteenth annual report of the poultry division of the Central Experimental Farm.

Among the subjects discussed are certain changes in the winter housing and feeding of poultry, and which changes are calculated to increase the value of poultry-keeping as a branch of farm work. Whether this laudable object will be fully, or partially attained in this northern latitude, is for experience to decide. Meanwhile, careful note of effects from various standpoints is being made. Some results which have already become conspicuous are discussed in the following report.

A remarkable indication of poultry development is the large number of letters received from numerous settlers who have made their home in the western provinces, notably those of Saskatchewan and Alberta. Many of these letters contain requests for a pattern of a winter house which will suitably comply with the winter conditions of the latter named provinces. To be satisfactory these houses should be—

(a) Cheap in construction, owing to the scarcity of lumber;
(b) Fairly comfortable in winter;
(c) Dry and affording ample floor space for each fowl.

In order to disseminate as much information, on these points, as is at present available in our department, the views of a correspondent in Saskatchewan, who, has given the subject careful consideration, are given in a following page.

The alteration in methods, already remarked on, and the nature of these changes, with details of the most important experimental work of the year, will be found in their proper places.

I have much pleasure in noting the successful efforts of my assistant, Mr. Fortier, in conducting his part of the experimental work of the past year. He has given much attention to the effect of different rations on the production of eggs during winter and to the artificial hatching and rearing of chickens. During the year Mr. Fortier delivered addresses at 30 different places in the province of Quebec.

Mr. Summers has been most careful and assiduous in collecting data relative to the trap nests system, the feeding of different experimental rations, and in connection with the hatching of eggs by both hens and incubators. His efficiency in the recording of results is worthy of remark.

Mr. George Deavy, who has for many years past been connected with this department, has been energetic in the caring for the fowls and young chickens entrusted to him, and in keeping the different poultry houses and their surroundings in good order and condition.

The large increase in correspondence from all parts of the Dominion in connection with the work of this department has been very gratifying. It alone demands much time and careful consideration. The great increase in the number of letters received from the older province of Quebec, is particularly noticeable, and may be taken as a fair instance of the rapid development which is taking place in the poultry interests of that province.

It is earnestly desired that the information contained in the following report will be found of practical worth and interest,

I have the honour to be, sir,
Your obedient servant,
A. G. GILBERT.

REPORT OF THE POULTRY MANAGER.

During recent years marked advance has been made in the methods of operating the different indoor and outdoor branches of farm work. In this march of improvement the poultry department has kept well to the fore. Before entering into a detailed account of the experimental work of the past year it may be interesting and instructive to glance at some changes which are noteworthy features of this development. The more conspicuous of these changes are as follows:—

1. In the style of winter house for the laying stock.
2. In the method of feeding both hens and chickens.
3. In the manner of selection other than by trap nests.

These changes have been made because calculated to be of greater economic value, for unless improved arrangement of winter house or methods of management tend to increase the margin of profit in poultry keeping they will be of little advantage over previous methods.

A BRIEF RETROSPECT.

Some years ago when winter egg production was urged upon the farmers of the country as a source of money-making, a warm winter house was considered indispensable as a means to that end. This warmth, in many instances, was secured by artificial means; in others by the construction of an unnecessarily substantial building—oft times too small—wherein it was surmised the animal heat of the fowls would be conserved. But this plan entailed expense, besides ventilation received little or no consideration, and over-crowding, in order to obtain the desired end, was general. Meanwhile, experimental work which had been steadily going on, unmistakably showed, that fowls kept under either condition came out of their winter quarters with impaired vitality. As a result the hatching of chickens from their eggs, whether by hen or incubator, was equally unsatisfactory. The experience of several years plainly showed that, it was not until the fowls had opportunity to run outside that the egg germs became strong enough to hatch out a satisfactory number of chickens. This experience was not singular. Poultry keeping was rapidly becoming more general throughout the country, and from many sources letters were received to the following effect, 'My hens have laid well during the winter, but, I cannot get their early spring eggs to give satisfactory hatching results.' Investigation was carefully carried on for several years and much useful information bearing on the subject was gained and published from time to time in the annual reports of this department. Among the conclusions arrived at were, that more fresh air, even if cold; more exercise, and greater variety of rations were necessary as remedial agents. The outside poultry world had also been moving in this matter. The result of the combined experience gained, was the introduction into Canada of the poultry house with and the poultry house without, the scratching shed attachment. Both styles of houses were strongly recommended as likely to overcome the drawbacks in connection with the winter production of eggs and subsequent loss of constitutional vitality on the part of the breeding stock.

To-day we have throughout the country both styles of houses, the one which the scratching shed attached to it, the other without the shed addition. From our standpoint as one of the most northern experimental plants in America, experience gained in the trial of these styles of houses cannot fail to be of the greatest importance to all who are interested.

The House with Scratching Shed.—In this style of building the main poultry room is constructed of boards with a window facing south. In this room the fowls roost at night, lay their eggs during the day, and eat their soft food and cut bone from narrow troughs. In poultry parlance it is known as the 'laying and roosting room.' The floor, which is best made of cement, is covered with litter. The roosts and platform, with the trap nests under the latter, are at the back of the room. There is a cotton screen to let down in front of the roost, if necessary, on very cold nights. The scratching shed addition is intended as a room to afford exercise for the fowls. The front of the scratching shed, in numerous cases, is made of cotton, with a window in the centre, and should face south. On the floor which should also be made of cement, litter to the depth of 4 to 6 inches, is always kept. In this litter the daily whole grain ration is thrown with the object of having the birds search diligently for the grain kernels. In this way the fowls are incited to exercise. The cotton front of the shed is calculated to give diffusion of fresh air without draft. Through the window the sunshine will find its way into the interior, which is very desirable. The bad practice, of taking out the window sash and replacing it with cotton, prevents the ingress of the sunlight. Houses built on this principle, but differing in arrangement of detail, are now found in many different parts of Canada. In some cases, notably in the Eastern part of the United States, the front of the scratching shed is entirely open with a wire netting front.

The House without the Scratching Shed Addition.—This style of house is very much on the same principle as the other. It might also be termed a compromise between the one extreme of entirely open front and the bottled-up method of housing the birds. Instead of two rooms there is only one and this one room is made slightly larger than the roosting room with shed attachment. This style of house was first adopted by Mr. L. H. Baldwin of Deer Park, Toronto, some years ago when he erected his large poultry plant in the locality named. Since then it has become much in vogue, presumably, because cheap as well as compact. A description of one of the many apartments in the long row of buildings forming part of the plant of the Pembroke Poultry Yards Company, Ontario, will probably best convey an idea of an up-to-date application of this method. Each colony of fowls occupies one pen, 10 x 16 feet in size. In the south end of the pen there is a window 4 feet square. Above and below the window there is a frame covered with cotton, one foot deep by four broad. The air through these cotton openings is diffused through the pen without draft, while light and sunshine find their way through the window. The ventilation by this means is considered most satisfactory. The floor of the pen is cement and is covered with the usual quantity of litter. The ceiling is slatted and above the slats, straw, to a depth of 12 inches is placed for the purpose of absorbing moisture. During the coldest period of the past winter, I was assured that there had been no moisture in any of the pens, and this result is attributed to the straw and ventilation through the cotton frames. At the north end of the pen are the roosts, platform, and underneath the latter, the nests. In front of the roosting place there is a cotton covered frame, 6 x 8 feet. This frame swings to the wall and is only used on very cold nights for the purpose of keeping the fowls comfortable. A four compartment hopper contains grit, oyster shells and charcoal. Whole grain is thrown in the litter on the floor. Drink water is regularly supplied, and from time to time meat and vegetables. Cases of sickness have been rare. In each pen to the left of the roosting place there is a small crated enclosure to hold two male birds for use during the breeding season. I was assured that the pens so arranged had given entire satisfaction. Such results gained at so northern a position are most important.

A plant of similar design, but with cotton front to the pens, with a window in the centre of each front, the front facing the south, is a style adopted at the poultry plant of the Muskoka Free Hospital for Consumptives at Gravenhurst, Ontario. In this establishment the dry hopper feeding system has been adopted, and has proved most satisfactory. The plant is in charge of Mr. E. S. Turville, one of the patients, but an experienced and successful poultry man. Mr. Turville assured me that he is a firm believer in fresh air and plenty of it, even if it is cold. 'I give my fowls,' he said, 'the same treatment that we get here. Fresh air and any amount of it. We are told that it is good for us and why should it not be good for my fowls?'

'Do you get many eggs per day during the winter season?'

'To-day, February 18th, we have collected 120. Sometimes we have a greater or lesser number.'

Some Reasons why the Scratching Shed Addition was Abandoned.

In conversation with the manager of the Pembroke Poultry establishment, I asked him why he had not adopted the scratching shed addition to his houses. He replied, 'We do not require it. I consider the scratching shed attachment useless expense. Had we considered it an advantage we should have embraced it in our system.'

The foregoing is one reason from a practical source. Another may be given as follows.

Close observation for some winters past has shown that during cold dips the birds are inclined to 'bunch' in the roosting and laying room. If they do go to search for their whole grain food which has been thrown into the litter on the floor of the scratching shed, they quickly return to the other apartment. The lesson from this is obvious. It is that the birds prefer the roosting room as being less cold than the other. From this it is to be inferred that the latest style of house, which is really a combination of the two styles described, will likely be the most suitable for this district.

Winter Houses for Other Provinces.—But there are other and newer provinces in which poultry keeping is comparatively a new branch of work. In such cases an appropriate style of house is a matter of importance. In a recently written letter, Mr. A. W. Foley, Commissioner of Poultry for the Province of Alberta, states his intention of testing various patterns of houses calculated to be suitable to the winter conditions of his district. He also says he will be glad to try any suggested style that would likely prove to be effective and not costly. The results of experimental work of this nature cannot fail to be of very great interest.

From Sunny Plains, Saskatchewan, Mr. C. E. Robinson writes in reply to a request—from the writer—to suggest a style of winter house suitable to his province, as follows: 'Sunny Plains, Sask., February 20th, 1907. I regret that I have not the means to try an experimental frame and sod house combined. From what I have seen here of frame and sod houses for human habitation, I think a sod house can be made as warm as a frame one, in fact, warmer. A neighbouring settler here has a sod house which is the easiest one kept warm in the district, and which is also perfectly dry. I have been thinking that a sod poultry house might answer well, if properly constructed, to keep poultry in.' In a more recent letter, Mr. Robinson emphasizes an important feature in this sort of house by saying:—'Last winter showed us that when other buildings sweated, dripped and froze, the sod house was dry and fresh.'

A Manitoba correspondent has an idea that the large quantities of straw in that province and which in many cases go to waste, might be utilized to make comfortable and cheap poultry houses.

At the Macdonald College, Ste. Anne de Bellevue, P.Q., the colony house system of keeping the winter layers has been to a great extent adopted, and was found highly successful during the past cold season.

Can there be too much Exercise?

At this point it may fairly be asked if too much importance has not been heretofore placed on exercise? There is no intention to belittle the exercising of the fowls as a factor in the winter production of eggs. There is reason, however, to believe that in certain cases, this practice has been carried to an extreme. An experience of twenty-five years has given opportunity to the writer for extended and close observation of many phases of poultry keeping. Frequently, during this period, has he noted extraordinary results from fowls kept under conditions in defiance of popular and almost cast iron instructions. One or two of these observations may be noted as follows:—(1) Fairly good winter egg production, followed by strong germs in early spring eggs. which resulted in 10, 11 and 12 robust chickens, out of a sitting of 13 eggs. These results were obtained from eggs laid by hens which were almost overcrowded in a roughly constructed unheated house with thin board walls; there was a scanty supply of litter on the floor which was dry earth. There was little opportunity for exercise in consequence. But the rations which embraced the waste of table and kitchen, were of the most varied nature. It did seem as if variety in the rations had more beneficial effect than exercise.

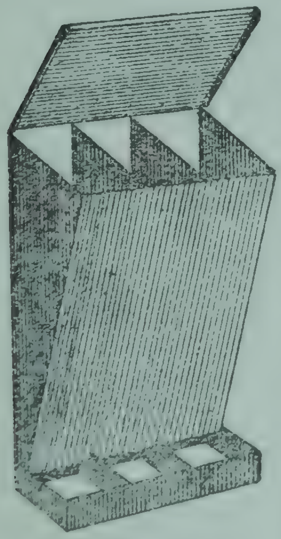
(2) The 'bunching' of the birds, in the roosting and laying room led me to mention the incident to an enthusiastic advocate of exercise. I told him that I thought the cold made the fowls disinclined to search in the litter for their whole grain food. 'Oh,' he said, 'the birds *have* to come to the scratching shed to get their whole grain.' 'But,' I remarked, 'they return to the roosting room as quickly as they can and apparently take little time for exercise.' 'That is quite possible,' he said, 'but for all that they layed well during the winter.' 'Yes,' I remarked, 'in spite of their lack of exercise. Your remark tends to confirm previous experience.'

A Change in the Manner of Feeding Hens and Chickens.

The change which has taken place in the method of feeding hens and chickens is certainly radical in its nature. The methods differ in this way, viz.:—

1. By the old way the food was *given* to the fowls.

2. By the new method the fowls are allowed *to help themselves* to their food which is always before them in hoppers; hence the title of the 'Hopper system' of feeding.



But what is a hopper? The accompanying illustration will show its manner of construction.

Hoppers are made of different sizes, but usually of similar pattern. Some are divided into two compartments, while others have three and four. One style of hopper which is very commonly used is that shown by the illustration. Two or more hoppers are put in each pen, according to size of the poultry house, and they are usually placed on the walls of the building. The compartments of the hoppers are filled, from time to time, with whole or ground grain, bran, beef scraps, charcoal, grit and broken oyster shells, etc. There are two ways of using the Hopper system, viz., (a) by which the feeding of grain, whole or ground, grit, etc., (with the exception of meat and vegetables) is entirely done from the hopper. (b) A compromise plan by which the ground grains, bran, &c., with exceptions as noted in (a), are given in hoppers, but the whole grain rations are thrown in the litter, always to be found on the floor of a properly equipped poultry house. This is done with the object of affording opportunity for the birds to obtain exercise. Where rats or other vermin are present the ground grains are placed, in the morning, in narrow troughs, and what is not used during the day is taken away at night. But the principle is the same, as free access is allowed to the contents of the trough. Another device to prevent possible waste is to cover the projecting lip of the hopper with a lid of tin or galvanized iron. But the best prevention to the depredations of vermin has been found to be that of a concrete floor.

Arguments for and against the Hopper System of Feeding.

Much is said for and against the Hopper system. Briefly summed up, some of these objections may be given as follows:—

Favourable.—Because labour saving; preventing waste or fouling of food; allowing each bird opportunity to obtain what food it desires; convenient and economical in use.

Against.—For the reason that birds of the heavy breeds are apt to eat too much and as a result are disinclined to exercise; not economical; fowls are not likely to go to roost with their crops as full as desirable; fowls scratch or pick out the grain from the hoppers; when fed out-doors prevents foraging, &c.

But there seems to be little objection from either side to this method when applied to the feeding of young chicks, hatched either by hens or incubator, and which are able to run abroad and forage for themselves.

The system is really a continuation of the old practice of 'leaving the food before the hens and chickens all the time.'

The feeding of dry ground grains in an open trough, in one of our department houses, during the past winter, was considered satisfactory. From what has been seen of the hopper system of feeding—at home and abroad—there is every reason to conclude that it has come to stay. Its proper operation depends very much upon the style of hopper and manner in which it is used.

Methods other than the Trap Nest for Distinguishing Good from Bad Layers.

Another instance of poultry development may be noted in the advertising of methods of detecting the good and bad layers other than by the older trap nest system. These methods or systems are sold at prices ranging from one to ten dollars each and they are, more or less, successful according to the ability of the student to understand the system which is taught by printed instructions and sent to the purchaser. That these systems are in vogue is shown by the appearance, in agricultural journals, of advertisements which offer 'eggs for hatching from egg-laying fowls selected by our system.' The name of the inventor of the system is then given.

Meanwhile improvements which tend to simplify and make more effective the operation of trap nests are being made. A strong point in favour of the trap nests method is its mechanically correct determinations. The drawbacks to its use in a large establishment, on the ground of expense, have been noted in a previous report. Its value in arriving at correct conclusions, in experimental work, is shown in the Tables which are a part of the following report.

EXPERIMENTAL WORK OF THE PAST YEAR.

The experimental work of the past year—with the exception of an unfinished part in connection with the selection of future breeding stock by the trap nest system—will be found in the following pages. The obtaining of *data*—calculated to show the worth of each individual hen—by means of the trap nest system usually begun on November 1, and extended to October 31 of the following year. In so doing the winter and spring periods of highest prices and best egg production were fully covered. To depart from this practice would be to interfere with the continuity of the records and impair their usefulness. For these reasons the different tables which appear in the following report are, as heretofore, dated from the beginning of the winter season of one year to the end of the fall season of the next.

The spring work of 1906 commenced with the artificial hatching of chickens by incubators. At a later date some hens were used. One strong point in favour of the incubator is that it is always ready. Opportunity is so afforded to those who are not specialists to begin operations as early as circumstances will permit. It has been impressed upon the farmers of the country, in previous reports, that they are likely to have best results from their incubators when operated in early or middle April. There has been no reason to alter this advice.

An object aimed at in our departmental spring work of last year was to have all hatching by incubators over by the end of May. As conditions were favourable this result was attained. The experience of many years has clearly shown that chickens hatched in early May are the most satisfactory to rear in brooder or by hen. Should it be desired to successfully hatch and rear a number of chickens, in the late winter or early spring months, the aid of special facilities in the shape of incubator room and brooder house will be found indispensable.

HATCHING BY INCUBATORS.

The results of the hatching by incubators during the months of March, April and May of last year are shown in the following table. Distinction is marked between the eggs from the cold houses and those from the warmed ones. The incubators were filled at three different dates, viz.: March 29, April 7, and May 7, 1906:—

First Setting.—Incubators Filled March 29, 1906.

Description of Eggs.	No. of Eggs.	Clear.	Dead germs.	Chickens dead in shell.	Chickens Hatched.	Percentage of Clear Eggs.	Percentage of Fertile Eggs.	Percentage of chickens dead in shell of selected Eggs.	Percentage Hatched of the Fertile selected Eggs.	Percentage hatched of total Eggs set.	Remarks.
Barred P. Rocks and W. Wyandottes	125	26	36	11	53	20¾	79¼	17¼	82¾	42¼	Eggs from unheated houses.
Buff Orpington's	52	11	17	7	17	21¼	78¾	29¼	70¾	32¾	" warmed houses.

Second Period.—Incubators Filled April 7, 1906.

Description of Eggs.	No. of Eggs.	Clear.	Dead Germs.	Chickens dead in shell.	Chickens Hatched.	Percentage of Clear Eggs.	Percentage of Fertile Eggs.	Percentage of chickens dead in shell of selected Eggs.	Percentage Hatched of selected Fertile Eggs.	Percentage hatched of total Eggs set.	Remarks.
Barred P. Rocks and W. Wyandottes	198	41	40	24	93	20¾	79¼	20½	79½	47	Eggs from unheated houses.
Barred P. Rocks, Leghorns, Orpingtons and Wyandottes	92	24	21	9	38	26¼	73¾	19¼	80¾	41¼	" warmed houses.

THIRD PERIOD.—INCUBATORS FILLED MAY 7, 1906.

Description of Eggs.	No. of Eggs.	Clear.	Dead Germs.	Chickens dead in shell.	Chickens Hatched.	Percentage of Clear Eggs.	Percentage of Fertile Eggs.	Percentage of chickens dead in shell of selected Eggs.	Percentage Hatched of selected Fertile Eggs.	Percentage hatched of total Eggs set.	Remarks.
Barred P. Rocks and W. Wyandottes.... ...	72	9	10	6	47	12½	87½	11¼	88¾	65¼	Eggs from unheated houses.
Plymouth Rocks, Wyandottes and Orpingtons.	62	8	15	3	36	12¾	87¼	7¾	92¼	58	" warmed houses.

Many useful deductions may be derived from a study of the above table. A few are noted as follows:—

1. There was little difference in the percentage of favourable results from the selected, or, fertile eggs of early or middle March and those of the same sort in May.

2. The percentage of clear eggs was less in the May eggs than in any other.

3. The percentage of chickens hatched from the fertile eggs of May was better than in any other month.

4. The difference between the percentage of 'fertile eggs' and results in chickens is most marked. This feature of incubation—particularly noticeable in early spring eggs—is fully discussed in the reports of the earlier work of this department 10 and 12 years ago.

5. Results go to emphasize the advice given to farmers and other poultry keepers, in this and preceding reports not to select eggs for hatching by incubator or hen until the fowls have had opportunity, in spring time, to run outside and recuperate from their long term of winter life and treatment.

6. The showing is in favour of the unheated house manner of keeping the laying stock during the winter season.

PROGRESS OF THE CHICKENS.

A strong germ which usually comes from constitutionally vigorous parent stock will, in most cases, emerge clear and clean from the shell as a robust chicken. But every chicken that hatches out in incubator or under hen is not such. The hen inadvertently tramps on or otherwise disposes of the weakling chicken. But the incubator nursery often sustains the weakling—unless meanwhile trampled to death by its more lusty mates—to reach the brooder, there to peep, or, mope itself to death. Frequently these weaklings are numerous and when they do most miserably perish, the incubator primarily and the brooder in the second place are held responsible in many instances for what mismanagement and improper feeding of the parent hens are directly responsible for.

The chickens were allowed to remain in the nursery of the incubators, or, under the mother hen for 24 hours, or, until strong on their legs. It was not desired that a weakling chicken, a deformed one or one unable to make its way out of the shell should be removed from the incubator. The rule to take no weakling from either shell, incubator or hen, should be rigidly observed. On being placed in the brooders, or with their mother hens removed to coops in a field, the chicks made satisfactory progress.

HOW THE CHICKENS WERE FED.

The care and treatment received by the chickens was the same as in preceding years. As inquiries are being frequently made as to best means of so doing the following summary may be permissible:—

First Day.—Little or no food. A few stale bread crumbs if absolutely required.

Second Day.—Stale bread soaked in milk and squeezed dry. Feed a little at a time and leave none to sour. A small quantity of hard boiled egg, chopped, fine may be added.

Third Day.—Add granulated oat meal to the foregoing. Finely crushed wheat may also be given, but in small quantity. Grit of small size should be now given to the chicks. Place it in small troughs or in shallow pans where it is easy of access.

From Third Day to Tenth Day.—Continue same treatment. At tenth day add finely crushed corn.

After this day whole wheat may be added. Give a small quantity at first. As the chicks grow older they should be given a mash composed of stale bread, shorts, cornmeal, ground meat, &c. Finely cut bone or meat will be found a great incentive to growth at this stage. On the chickens becoming eight weeks of age their rations may be dropped to three per day. Care should be taken that they are generously fed at last ration. For drink give skimmed milk or water or both. When fully feathered the hen-hatched chickens should be removed from their mothers. The chickens will be found to return to their coops as usual, and they are allowed to remain in them until removed to more commodious quarters in colony houses. On the incubator-hatched chickens becoming too large for the brooders they were also removed to colony houses.

Many breeders give only crushed ground grains from the first with grit of proper size always in supply. Excellent results have attended this method. Again, the hopper system of feeding the chickens is rapidly becoming popular. By this method the food is before the youngsters all the time, in hoppers, and they help themselves to what they want and when they feel inclined to take it.

The feeding of whole grain in open troughs, of small size, placed throughout the fields of our department last summer, was very satisfactory.

Water is given at an early period of life in some instances and in others not for 5 or 6 days.

It does not seem to have any different results in the desired progress of the chicks whether the soft or hard, wet or dry, system of feeding is adopted. What is of paramount importance is care and regular feeding.

THE FIRST PULLETS TO BEGIN LAYING.

The pullets commenced to lay in the following order and at the dates mentioned, viz.:—

Pullets.	Hatched.	First Egg.
	1906.	1906.
White Wyandotte	April 24	November 24
" "	" 24	" 28
" "	" 24	" 30
Salmon Faverolle	May 2	December 1
White Plymouth Rock	1st week in May.	" 6
Barred " "	"	" 10
Buff Orpington	April 24	" 18
Black Minorca	" 24	" 23

Eggs Laid from November 1, 1905, to March 31, 1907.

1905—	
November	355
December	954
1906—	
January	1,393
February	1,349
March	2,799
April	2,786
May	2,206
June	1,690
July	1,381
August	563
September	236
October	53
Total number	15,765
November	138
December	967
1907—	
January	1,561
February	1,773
March	2,415
Total number of eggs for 17 months	22,619

DISEASES OF POULTRY.

A number of inquiries were received during the year as to the nature of ailment affecting poultry in different parts of the Dominion. Remedies were suggested an advice given which were considered suitable to the exigencies of the various case described. Several *postmortem* examinations of birds which had died from symptom of infectious and contagious diseases were kindly made by Dr. Higgins, Pathologis Biological Laboratory, during the year and much valuable information as to caus of death received.

BUILDING UP HARDY AND PROLIFIC EGG-LAYING STRAINS OF FOWLS

WARM VS. COLD HOUSES.

The work of building up prolific egg-laying strains of fowls—with a view to thei being hardy and good egg-layers during the winter season of high prices—was con tinued during the year. This work was commenced in the month of January, 190 As aids in securing desired results, trap nests and unheated houses—with scratchin shed attachments—were called into requisition. This work is one of the greatest im portance and is unavoidably slow. The progress so far made is certainly satisfactor In some instances as will be seen in the tables following, better egg-laying result have been undoubtedly secured, while in other cases the advantage of the unheate house (with its cold but fresh air, as compared with the warm one), is made evident.

The first table shows results from 12 Barred Plymouth Rock pullets kept in warm house. Table No. 2, immediately following, gives results from a similar num ber of hens kept in an unheated house. A comparison between the two tables is fu of import to all who are interested in this line of work.

TABLE I.—Individual hen records as shown by trap nests. 12 Barred Plymouth Rock pullets, hatched May 20, 1905. Pen 1. Warm house.

FROM NOVEMBER 1, 1905, TO OCTOBER 31, 1906.

Hen No.	November.	December.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	Total of Eggs laid.	Remarks.
	1905		1906											
8	0	0	4	13	6	7	8	8	10	0	0	0	56	Broody 3 times.
24	0	0	0	6	18	6	12	11	9	0	0	0	62	" 4 "
25	0	2	8	5	15	11	22	15	1	0	0	0	79	Showed no broodiness.
68	0	7	10	3	11	4	4	0	0	0	0	0	39	Broody in March. Used as setter from May 5 to July 4.
80	0	0	9	9	19	8	15	10	6	0	3	0	79	Broody once.
90	0	0	3	2	18	7	10	7	3	9	0	0	59	" twice.
92	0	0	13	8	13	9	13	14	4	7	0	0	81	" once.
99	0	14	13	7	15	7	8	6	1	12	0	0	83	Showed no broodiness.
20	0	0	0	1	10	13	11	10	6	2	10	0	63	Broody 3 times.
33	0	0	0	3	16	19	18	6	6	11	0	0	79	" once.
100	0	0	0	4	18	14	15	12	0	2	0	0	66	" 3 times.
64	0	1	2	3	10	13	6	10	0	0	7	0	52	" 4 "
									1				1	Laid in straw.
Totals.	0	24	62	64	169	118	142	110	46	43	20	0	799	Average egg yield 65¾ per hen.

It will be noticed that the above pullets were inmates of a pen in a warm house. The heating was done by coal stove situated in the centre of the building.

RATIONS USED IN ABOVE PEN 1.

The whole grain ration, which was fed morning and evening, was composed of ⅓ wheat; ⅓ buckwheat; ⅓ oats. The grains were mixed and thrown in the litter on the floor of the pen.

Mash which was given in small quantity at noon of each day, was made of ⅖ bran; ⅕ ground oats; ⅕ ground corn; ⅕ meat meal.

Grit, broken oyster shells and pure water were in regular supply. No cut bone was given, as meat meal formed part of the mash.

Quantities of different grains, &c., used in the months specified, were whole grains 538 lbs.; mash, 198 lbs.; grit, 28 lbs.; oyster shells, 28 lbs.

TABLE II.—Pen 36. Showing the record of 13 Barred Plymouth Rock hens, 2 years of age, in an unheated house, as compared with 12 pullets of same variety in Pen 1, which was warmed.

The results in the following record are interesting when compared with those of the previous Table 1, as showing a difference in favour of the unheated winter house of modern design. Pen 36, which contained 13 two year old B. P. R. hens, was one of two apartments in an unheated house situated some distance from the main buildings. This apartment 36, as well as the other, had a scratching shed attachment, the front of which was entirely of cotton with a window in the centre, facing south. It was in this and other similarly constructed scratching shed attachments that the disinclination of the fowls to stay, during cold dips, was noticed. The centre divisions of the building were more substantially finished. They are known as the 'roosting and laying rooms,' for, in them the hens do both. Instead of cotton, the fronts are boards with windows in the centre. It was presumably because these apartments were less cold than the scratching sheds attached to them, that the fowls showed inclination to 'bunch' in them during cold periods. Notwithstanding, the winter egg record of this unheated Pen 36 is nearly 11 per cent greater than that of Pen No. in a warmed building. It is to be borne in mind—in making a comparison—that th inmates of pen 36 were hens, two years of age, as compared with pullets in No. 1 Again, it is of import to know that the inmates of apartment 36 were never in an but unheated quarters, while the pullets in Pen 1 had not yet been in any but a comparatively warm habitation. The showing is in favour of the cold house principl and the early inuring of the young stock to the colder conditions. The figures of thi experiment are as follows:—

TABLE II.—DETAILED ACCOUNT OF RESULTS.

B.P.R. — Hen No.	November.	December.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	Total of Eggs laid.	Remarks.
	1905		1906											
2	0	5	1	0	1	9	8	7	7	5	0	0	43	Broody three times.
4	0	1	17	4	8	9	11	12	5	1	5	0	73	" once.
*33	0	0	0	0	0	5	7	8	5	1	6	0	32	" three times.
34	0	0	0	0	0	9	12	14	7	3	0	0	45	Showed no broodiness.
46	0	3	20	19	22	8	11	1	0	0	0	0	84	Died August 23 of apoplexy Broody once.
56	0	0	0	0	7	16	12	8	12	0	0	0	55	"
61	0	14	17	10	11	18	20	11	8	13	0	0	122	"
72	0	3	15	10	8	14	19	16	18	4	10	0	117	Showed no inclination to set.
74	0	0	11	7	14	15	5	13	12	2	0	0	79	Broody twice.
85	4	0	15	8	11	14	17	3	4	4	1	0	81	" "
94	0	9	10	4	8	17	15	18	11	2	11	0	105	" once.
96	0	0	0	0	2	19	19	13	10	11	0	0	74	" twice.
98	0	11	8	8	8	9	21	3	0	0	0	0	68	" "
		1		1					2	1			5	These eggs were laid on the floor
Totals.	4	47	114	71	100	162	177	127	101	47	33	0	983	Average 76 eggs.

RATIONS.

The rations given to the fowls in the above pen 36, were in quantity and quality s follows:—

Whole grain ½ oats, ½ wheat. Fed morning and evening. The grain was throwr nto the straw on the cement floor of the scratching shed and afforded good opportunit o exercise.

Mash composed of ground grains slightly dampened was fed at noon twice pe eek.

Cut bone.—When mash was not fed, cut bone was given.

Green food.—Mangels, turnips, &c., grit, oyster shells and water were always i upply.

Quantities fed—

Grain	641 lbs.
Mash	119½ "
Cut bone	44 "
Beets	85 "
Grit	37 "
Oyster shells	37 "

TABLE III.—Pen 37—Adjoining No. 36—under same roof and of same description, with cotton front scratching shed. The inmates were 13 White Wyandotte hens, two years of age in 1906. Trap nest record from November 1, 1905 to November 1, 1906.

As with the Barred Plymouth hens in adjoining pen 36, they had always been kept in cold quarters. Results are slightly over 8 per cent better than those from the birds in warmed pen 1 of house 1, and which is first given.

Hen No.	November.	December.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	Total of Eggs laid.	Remarks.
	1905		1906											
1	5	7	13	9	8	1	0	13	6	1	0	0	63	Broody twice.
3	1	12	9	9	11	4	6	0	0	0	0	0	52	Showing no broodiness.
5	0	1	0	2	8	7	18	16	6	0	0	0	58	"
15	9	4	0	6	11	8	18	22	17	10	0	0	105	"
19	0	17	16	17	11	14	12	9	9	9	0	0	114	Broody three times.
24	0	0	0	14	16	15	7	9	8	7	0	0	76	" " "
41	0	0	0	2	13	17	21	12	0	0	0	0	65	" once.
67	0	11	22	16	9	8	14	0	0	0	0	0	80	" " Died June 11.
68	0	0	0	6	11	10	6	10	5	5	0	0	53	" twice.
73	2	16	16	14	9	12	19	16	18	5	0	0	127	Showing no inclination to set.
77	0	0	7	0	7	12	15	0	9	0	0	0	50	Broody once.
83	2	5	8	8	12	11	7	12	4	0	0	0	69	Showing no broodiness.
92	3	8	6	7	12	3	2	3	5	0	0	0	49	Broody once.
		4							2				6	These 6 eggs were laid on floor.
Totals..	22	85	97	110	138	122	145	122	89	37	0	0	967	Average 74½ eggs per hen.

Rations were the same as given to the fowls in pen 36—the preceding one.

TABLE IV.—Pen 4. House No. 1. Warmed. Nine Buff Orpington pullets hatched May 20, 1905. From November 1, 1905 to November 1, 1906.

The showing made by these pullets is not as good as those of the Barred Plymouth Rock, or White Wyandotte hens of the cold 36 and 37 houses.

Hen No.	November.	December.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	Total of Eggs laid.	Remarks.
	1905		1906											
11	0	0	18	10	12	11	4	9	1	1	4	0	70	Broody three times.
18	0	3	6	6	3	10	3	0	10	0	0	2	43	Used as setter from May 5 to July 4. Broody once after.
*27	0	0	3	2	13	3	7	0	0	0	0	0	28	Showing no broodiness.
35	0	13	16	3	18	7	7	7	8	8	0	0	87	Broody three times.
59	0	21	23	14	20	13	20	14	14	7	4	0	150	" twice.
*68	0	0	0	0	1	5	3	0	0	0	0	0	9	" once.
70	0	0	5	17	19	10	7	7	9	0	0	0	74	" twice.
*75	0	0	0	2	7	4	2	0	10	5	3	0	33	" three times.
*96	0	11	4	0	0	2	1	2	6	1	0	0	27	" twice.
Totals..	0	48	75	54	93	65	54	39	58	22	11	2	521	Average 58 eggs per hen.

* The eggs from the four hens marked with a star were not used for breeding purposes.

Rations.—Whole grain ½ oats, ½ wheat; mash, ½ ground oats; ½ ground corn; Cut green bone twice per week. Grit, roots and drink water in regular supply.

Quantities fed.—Whole grain, 398 lbs.; ground grains, used in making mash which was given twice per week, 88½ lbs.; roots, 3 times per week, 58 lbs.; Cut bone, twice per week, 27½ lbs.

TABLE V.—House No. 1, pen 6: warm. Record of 12 White Leghorn pullets hatched in May, 1905. From November 1, 1905 to November 1, 1906.

The inmates of this pen made a better showing than any variety kept in the warmed houses.

FROM NOVEMBER 1, 1905, TO NOVEMBER 1, 1906.

Hen No.	November.	December.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	Total of Eggs laid.	Remarks.
	1905		1906											
7	5	11	12	14	20	11	11	14	12	7	0	0	117	
13	0	0	10	4	11	16	9	0	0	0	0	0	50	
*22	0	0	0	1	7	10	14	4	0	0	0	0	36	
30	2	15	11	12	4	5	9	10	11	1	0	0	80	Broody once in March.
32	0	15	15	18	13	10	7	8	17	0	0	0	103	
46	1	2	14	2	12	15	5	3	0	13	3	0	70	
58	0	6	15	6	17	15	3	0	0	0	0	0	62	
64	0	1	6	8	18	17	4	9	9	1	0	0	73	
76	6	9	13	16	19	16	9	13	18	1	0	0	120	
*83	0	0	0	4	9	7	5	5	0	0	0	0	30	
84	0	7	10	13	17	16	6	4	0	0	0	0	73	
93	0	8	12	8	16	16	10	14	16	0	0	0	108	
	....	2	2	....	....	....	...	....	...	..	...	....	4	These eggs were laid on the floor.
Totals..	14	76	120	106	163	154	92	84	83	31	3	0	926	Average 77⅙ eggs per hen.

* The eggs from hens marked with a star were not used for breedng purposes.

Rations and Manner of Feeding them:

Whole grain, ½ wheat, ½ oats; thrown every morning and evening in litter on the floor.

Mash.—Four parts shorts; 4 parts ground oats; 3 parts ground barley. Occasionally clover hay was mixed in mash during winter. The mash was given at noon every three days.

Cut green bone, every 3 days at noon when mash or green food was not given.

Green food, every 3 days.

Other essentials in supply.

Quantity of food used.—Whole grain, 517 lbs.; ground grains, 129 lbs.; cut bone, 35¼ lbs.; roots, 48 lbs.; grit, 18 lbs.; oyster shells, 19 lbs.

GOOD AND BAD STRAIN. THE BENEFICIAL RESULTS OF SELECTION BY TRAP NESTS.

TABLE VI.—Individual Records shown by trap nests of 5 White Leghorn pullets of good strain. Pen 19. House No. 2.

The following table shows satisfactory results from the use of trap nests and the benefit of securing a good laying strain of fowls to build from. Two years ago the parent stock of the following pullets were selected by trap nest:—

FROM NOVEMBER 1, 1905, TO NOVEMBER, 1906.

Hen No.	November.	December.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	Total of Eggs laid	Remarks.
	1905		1906											
2	0	8	13	18	21	18	2	9	5	4	0	9	98	
11	0	12	17	12	5	12	6	9	0	0	0	4	73	May 3, Broody and broken up.
19	0	9	15	15	20	16	15	15	14	6	0	0	125	
43	0	8	7	12	20	14	12	10	10	0	0	0	93	
64	0	12	18	17	21	19	6	11	12	2	0	0	118	
Totals..	0	49	70	74	87	79	41	54	41	12	0	0	507	Average 101⅖ eggs per hen.

TABLE VII.—Showing a poor egg-laying strain, bred from parent stock which trap nests recorded as inferior layers.

Individual records of 5 White Leghorn pullets as shown by trap nests from November 1, 1905, to November 1, 1906. Pen 18. House No. 2.

FROM NOVEMBER 1, 1905, to NOVEMBER 1, 1906.

Hen. No.	November.	December.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	Total of Eggs laid.	Remarks.
	1905		1906											
9	0	10	5	7	14	18	13	8	0	0	0	0	75	
18	0	7	13	8	11	14	13	9	12	6	5	7	105	
41	0	7	17	3	18	14	15	7	6	8	0	0	95	
47	0	0	1	6	6	7	4	10	0	0	0	0	4	
96	0	10	13	14	17	16	6	1	0	0	0	0	7	
	....	1	....	....	....	....	...	....	....	....	...	....	1	Laid on floor.
Totals..	0	35	49	38	66	69	51	35	18	14	5	7	387	Average, 77⅖.

The inmates of the above pens 19 and 18 were side by side in the same house and fed the same kind of rations, the conditions were thus identical in both cases.

For interesting particulars in relation to the above two pens, see table 5 on pages 244 and 245, 1905 report.

STOCK on hand on March 31, 1907.

Pen. No.	Breed.	Cocks.	Hens.	Cockerels.	Pullets.	Total.	Remarks.
1	B. Ply. Rocks	....	14	1	....	15	
2	Wh. "	1	9	....	3	13	
3	Buff Orpingtons	....	....	1	14	15	
4	" "	1	15	....	....	16	
5	Wh. Leghorns	1	3	....	11	15	
6	" "	1	13	....	....	14	
7	Blk. Minorcas	1	7	....	6	14	
8	Wh. Orpingtons	....	....	1	15	16	
9	Faverolles	....	4	1	4	9	
16	Blk. Hamburgs	1	4	....	4	9	
18	Wh. Leghorns	1	5	....	..	6	Poor egg laying strain.
19	" "	1	5	....	....	6	Good " "
20	Buff. "	1	5	....	1	7	
22	L. Brahmas	1	2	....	5	8	
23	S. G. Dorkings	1	4	....	1	6	
24	Wh. Orpingtons	....	5	1	...	6	
25	S. L. Wyandottes	....	4	1	4	9	
26	Mixed pullets	....	....	....	7	7	
27	" "	....	....	....	6	6	
28	B. Ply. Rocks	....	....	1	10	11	
34	" "	....	....	1	26	27	Unheated apartment.
35	Wh. Wyandottes	....	....	1	25	26	" "
36	B. Ply. Rocks	....	20	1	....	21	" "
37	Wh. Wyandottes	1	17	....	....	18	" "
22	Capons	....	....	3	....	3	
	For breeding and eating purposes	....	....	26	3	29	In different pens.
	Totals	12	126	39	145	332	

EXHIBITION AT THE CENTRAL CANADA FAIR.

An exhibition of a similar kind to that of the year before was given in the Experimental Farm building at the Exhibition of the Central Canada Fair, held in the early part of September of last year, in this city. The display embraced many interesting features. It showed the hatching and brooding of chickens by natural and artificial means; the best methods for care and management of the young chicks; models of suitable poultry houses; fattening crates and a number of specimens of the most popular utility varieties placed in wire coops of latest design. There were besides displays of dressed poultry and eggs laid by different breeds. The whole exhibit was well arranged and was both attractive, interesting and instructive.

THE PRESERVATION OF EGGS.

By Frank T. Shutt, M.A.
Chemist, Dominion Experimental Farms.

For eight successive seasons we have conducted experiments in egg preservation by means of various fluids, the formulæ of which had been collated from various sources. Three years ago we concluded that of the large number of solutions under trial, two only, viz., lime-water and sodium silicate (water glass), were worthy of further investigation. We also stated at that time that of these two preservatives, lime-water was from every point of view the more satisfactory. The results of the experiment now to be described, undertaken at the request of the Poultry Division, furnish still further evidence—and that of an emphatic character—in favour of lime-water.

Thirteen months ago fertilized and non-fertilized eggs were put (a) in lime-water, and (b) in 5 per cent solution of sodium silicate, the containers being stoppered bottles. During the whole period the bottles were kept in the laboratory, the temperature of which might vary between 60° and 80° F., with a mean of about 68° F.

LIME-WATER.

Fertilized Eggs.—The tinging of the 'white' was somewhat pronounced. The yolk was globular and of good colour. There was no marked odour from the broken egg. All the eggs examined in this test were sound and usable for cooking purposes, but they were distinctly inferior, both before and after poaching, to the non-fertilized eggs in the same preservative.

Non-fertilized Eggs.—The 'white' compared with that of freshly laid eggs, was faintly tinted with yellow and somewhat more limpid. The yolk was globular and of normal appearance. There was no adhesion of yolk to the side of the shell and no mixing of the yolk and white occurred in cracking the shell preparatory to poaching. Every egg opened was sound and usable. Several of the eggs were poached and not one of them developed any markedly unpleasant odour or taste, though, of course, the pleasant flavour of the newly laid egg was not present. The opinion expressed by the majority of those examining the poached eggs was that the flavour was 'slightly stale and limey.'

SODIUM SILICATE (WATER GLASS) 5 PER CENT SOLUTION.

Fertilized and Non-fertilized Eggs.—In this preservative there was practically no difference between the fertilized and non-fertilized eggs. The 'white' was distinctly discoloured, being of a pinkish-red, and very limpid. The yolk was thin, discoloured and degraded. On cracking the eggs preparatory to poaching it was found impossible to prevent the running together of the yolk and white, owing to the softening of the skin or envelope surrounding the yolk. Possibly from 50 per cent to 70 per cent of the eggs examined might be used for some classes of cooking, but certainly 30 per cent of them were thoroughly bad and totally unfit for human consumption in any form. The slightly 'alkaline' taste and odour and the distinctly disagreeable appearance of even the best of these eggs would entirely prevent their use on the table.

This has been, of course, a most severe test. Thirteen months at ordinary room temperatures constitute conditions not frequently required to be met, yet the saturated lime-water has under them proved itself a very satisfactory preservative and more especially so when the eggs are non-fertilized.

May 21, 1907.

EXPERIMENTAL FARM FOR THE MARITIME PROVINCES.

NAPPAN, N.S., March 30, 1907.

To DR. WM. SAUNDERS, C.M.G.,
Director Dominion Experimental Farms,
Ottawa.

SIR,—I have the honour to submit herewith my report of the operations for the past year on the Experimental Farm for the Maritime Provinces at Nappan, N.S.

The past season was not a particularly good one, the long wet period in the spring had the effect of making all spring-sown crops from one to three weeks later than usual, which resulted in moderate crops of all sorts, except hay, which did not suffer so much from this cause. Hay was on the whole slightly better than usual. Following the particularly late spring came a prolonged dry spell in the later part of the season which resulted in grain ripening somewhat rapidly, causing the crop to be rather light and the quality of the grain not quite up to the average, while roots, and fall-growing crops suffered very materially. These conditions brought hay quite up to the average in crop, while grain was below the average both in quantity and quality. Mangels were better and turnips slightly below the average, while corn was quite up to the average. The new take of grass started well, but made poor growth during the latter part of the season. Pasture was decidedly poor, except in the very early part of the season. The lessening of the crop in some particulars has been more or less offset by the very high prices of all kinds of farm produce. The season's operations closed up very suddenly and left many farmers with much fall work unfinished.

I have again to acknowledge my indebtedness to Mr. J. Thomas Coates and Mr. R. Donaldson, who have kept all records of crop and live stock experiments in a careful and painstaking manner.

WEATHER.

December, 1905, commenced fine with light rain on the 3rd and light snow on the 4th. Another snowfall on the 10th made sleighing for the rest of the month. The thermometer registered 7° below on the 16th, which was the lowest for the month.

January opened fine until the 4th, when a warm rain fell, the mercury rising from zero to 40°. A light snow fell on the 9th. On the 12th and 13th rain fell and spoilt sleighing for the rest of the month. Another light snow fell on the 18th, but not enough to make sleighing. The rest of the month was fine excepting on the 24th, when a light rain fell. The thermometer went to zero on the 4th, 2° below zero on the 10th, the lowest being 9° below zero on the 11th.

February opened dull and foggy until the 3rd, when it turned cold. On the 6th there was a light snow storm and cold weather followed. On the 15th another snowstorm came, making good sleighing. The rest of the month was fine, finishing on the 28th with a rather heavy snowstorm. The mercury registered zero on the 4th, 14° below zero on the 17th, 5° below on the 18th, and zero on the 20th.

March opened with a cold rough storm, followed by fine weather until the 9th, after which the weather was much broken. A fine week from the 20th to the 27th was followed by rain and dull weather during the remainder of the month. The the mometer registered 2° below zero on the 1st and 3° below on the 19th.

In April snow fell on the 6th, 10th and 12th. The weather then continued fir until the 22nd, when a heavy rain (2 in.) fell. The remainder of the month was fir with the exception of the 26th, when a light rain fell at night.

During May we had an unusually heavy rainfall, 4·85 inches. Rain fell o twelve different dates during the month. From the 8th to the 26th the weather wa fine with the exception of a light rain on the 10th and 13th. Seeding was begun o the 17th and continued until the 26th, after which heavy rains fell. The thermomete registered frost on the 4th, 9th, 12th, 22nd and 24th.

On June 3 the thermometer registered 32°, but no damage was done to fruits o tender plants. This month was much broken with showery weather, the rainfall bein heavier than usual. Rain fell on nine different dates during the month and seedin operations were very much hindered, finishing only on the 30th. On the 28th the the mometer registered 79° and on the 29th 80°.

July opened fine and fair with a light rain on the 4th, followed by fine weathe and crops grew well all this month. The temperature was higher than the previou year, 85° being recorded on the 15th, 84° on the 16th and 86° on the 23rd.

August was fine and very dry. The total rainfall for the month being only 1·7 inches. All crops suffered for want of rain. The hay crop, of which very little wa cut before this month, ripened extremely fast. Grain also ripened fast and there wa no growth of aftergrass. The thermometer registered 80° or above 80° on fourtee different dates, going as high as 84°, 85°, 89° and 91°, respectively, on the 6th, 10t 19th and 20th of the month.

September was fine and fair practically all the month, the only rain of any con sequence fell on the 23rd. The weather was ideal for harvesting, but particularly poo for the growth of roots or aftergrass. The lowest temperatures for the month bein 31° on the 16th, and 30° on the 29th.

October was unusually dry and fine until towards the end of the month. Rai fell on the 23rd, 25th and 28th, 4·26 inches being the total rainfall for this mont On the 3rd, 9th, 13th, 14th, 15th, 17th, 18th, 19th, 22nd, 25th and 31st, 1°, 2°, 9°, 6° 2°, 7°, 3°, 3°, 7°, 5° and 1° of frost were recorded respectively.

November was very rough with much rain and snow. 5·50 inches of rain fel during the month. Snow fell on the 6th, 8th, 12th, 14th, 22nd, 23rd and 27th. Ther was very little frost previous to the 22nd, when 7° was recorded and on the 25th, 27t 28th, 29th, and 30th, 13°, 6°, 7°, 7° and 16° were recorded respectively.

The first half of December was cold and stormy. On the 16th the weathe cleared and from then until the 19th was fine and moderate. From the 19th th balance of the month was rainy, dull and warm and no frost was recorded unti the 31st, when the thermometer registered 15° of frost. The thermometer registere below zero on the 3rd, 6th, 8th, 9th, 10th and 19th, 15° below zero on the 10th bein the lowest for the month.

January, 1907, opened with a light snowfall on the 1st, followed by fine weathe until the 26th, except on the 4th and 13th, when light snow storms prevailed. O the 26th, snow fell and again on the 30th, the last day of the month being fine. O the 10th, 5° below zero was recorded and from the 16th until the end of the mont the temperature was below zero every day with the exceptions of the 19th, 20th, 21s 26th and 27th, 17° below zero on the 29th was the lowest temperature recorded.

February opened fine, followed by rain on the 2nd and a snow storm on the 5t After this from the 6th to the 10th the weather was clear and cold. Snow fell on th 11th, 16th, 17th and 18th, and on the 21st a thaw nearly spoiled the sleighing. Sno fell again on the 25th, the remainder of the month being fine and cold, 4° below zer was recorded on the 4th, 7th and 9th, 13°, 3°, and 7° below zero on the 8th, 12th an 13th, respectively, zero on the 18th and 19th and from the 23rd until the end of th month the thermometer went below zero every night, 13° below on the 8th was the lowest for the month.

March. The first half of this month was fine with the exception of light snowfalls on the 2nd, 8th, 14th and 15th, the balance of the month being rough with high winds, rain and snowstorms. On the 1st, 4th, 5th and 6th, the mercury registered below zero, 15° below on the 6th being the lowest recorded for the month. From this date until the end of the month very little frost was experienced. The extremes for this time being 47° on the 31st, and 13° on the 16th.

METEOROLOGICAL RECORD.

The maximum and minimum monthly thermometrical observations for the year beginning December 1, 1905 and ending March 31, 1907.

Month.	Maximum.	Minimum.
	°	°
December, 1905	3rd, 50 above zero	16th, 7 below zero.
January, 1906	24th, 52 "	12th, 13 "
February "	21st, 48 "	17th, 14 "
March "	4th, 46 "	19th, 3 "
April "	21st, 61 "	8th, 10 above zero.
May "	19th, 72 "	22nd, 28 "
June "	29th, 80 "	12th, 33 "
July "	23rd, 86 "	2nd and 6th, 38 above zero.
August "	19th, 89 "	18th, 41 above zero.
September "	13th, 76 "	29th, 30 "
October "	6th, 74 "	13th, 23 "
November "	19th, 56 "	30th, 16 "
December "	25th, 50 "	10th, 15 below zero.
January, 1907	20th, 51 "	18th, 18 "
February "	21st, 46 "	8th, 13 "
March "	31st, 47 "	6th, 15 "

EXPERIMENTS WITH OATS.

Experiments were again conducted this year with the leading sorts of oats which were grown in uniform test plots of one-fortieth acre each. Thirty-seven varieties were included in this test. The plots received the same treatment and were on soil practically uniform throughout.

The ground was a clay loam, on which mangels were grown the previous year (1905), for which crop twenty one-horse cart loads of barnyard manure per acre were used. Grain was grown on this land in 1903, and hay in 1904. The land was ploughed in the fall of 1905 and harrowed in the spring of 1906 with the spring-tooth and smoothing harrows, until a fine tilth was made. The seed was sown on May 18th with the seed drill at the rate of 2½ bushels per acre.

This ground was also seeded down to clover and timothy at the rate of 7 lbs. Mammoth Red clover, 3 lbs. Alsike clover and 12 lbs. Timothy seed, per acre, by means of a grass seed attachment to the grain seeder.

The seed was from selected heads of the previous season's crop, cut from the various plots at harvest time.

No fertilizer was used on these plots this season. The grain started well as did also the grass seed, but owing to the extreme drought through July and August, the grain ripened prematurely. The straw was fairly stiff, but showed a considerable amount of rust and a few heads of smut were noticed. The following yields were obtained:—

OATS—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw, including Head.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.		Weight per measured Bushel after cleaning.
				Inches.		Inches.		Lbs.	Bush.	Lbs.	Lbs.
1	Goldfinder	Aug. 30	104	40 to 44	Stiff	6 to 9	Branching	3,400	63	18	33
2	Golden Beauty	" 27	101	40 " 44	"	6 " 8	"	3,880	57	2	31
3	Tartar King	" 27	101	46 " 50	"	6 " 7	Sided	3,880	56	16	37
4	Siberian	" 27	101	35 " 38	"	6 " 7	Branching	3,320	55	20	33
5	Kendal Black	" 27	101	39 " 43	"	6 " 8	Sided	3,400	55	10	36
6	Golden Fleece	" 29	103	40 " 43	"	6 " 8	Branching	2,840	55	10	34
7	Milford Black	" 27	101	36 " 40	"	6 " 8	Sided	3,800	54	26	36½
8	Lincoln	" 25	99	42 " 46	"	6 " 8	Branching	3,680	52	12	32
9	Golden Giant	Sept. 5	110	40 " 44	"	6 " 9	Sided	3,720	51	26	32
10	Improved Ligowo	Aug. 25	99	36 " 40	"	6 " 8	Branching	3,600	50	20	36¼
11	Pioneer	" 25	99	38 " 42	"	6 " 8	"	3,600	50	20	35
12	American Beauty	" 28	102	40 " 43	"	6 " 9	"	3,080	50	20	31
13	Bavarian	" 27	101	36 " 40	"	7 " 9	"	2,960	50	0	33½
14	Swedish Select	" 27	101	42 " 46	"	6 " 8	"	2,800	49	14	32
15	Milford White	" 27	101	36 " 42	"	6 " 8	Sided	3,280	49	14	36½
16	Holstein Prolific	" 28	102	40 " 44	"	6 " 9	Branching	3,320	49	14	33
17	Thousand Dollar	" 25	99	44 " 48	"	6 " 8	"	2,920	48	28	32½
18	Virginia White	" 25	99	36 " 40	Medium	6 " 7	"	3,200	48	8	33½
19	Kendal White	" 27	101	38 " 41	Stiff	6 " 8	Sided	3,080	48	8	32½
20	Improved American	" 29	103	36 " 40	"	5 " 8	Branching	3,480	46	16	30
21	American Triumph	Sept. 5	110	44 " 48	"	6 " 9	"	3,760	45	30	35
22	Joanette	Aug. 25	99	36 " 39	Medium	5 " 8	"	3,520	45	10	32½
23	Banner	" 25	99	37 " 40	Stiff	6 " 8	"	2,920	44	24	33
24	Danish Island	" 28	102	36 " 40	"	5 " 7	"	2,760	44	24	32
25	Olive Black	" 27	101	37 " 40	"	6 " 8	Sided	3,600	44	24	35½
26	Twentieth Century	" 25	99	36 " 38	"	6 " 8	Branching	3,160	43	18	34
27	Columbus	" 29	103	36 " 38	Medium	5 " 7	"	3,060	43	18	31½
28	Storm King	" 27	101	44 " 48	Stiff	6 " 9	Sided	3,240	42	32	37
29	White Giant	" 27	101	36 " 38	Medium	5 " 7	Branching	2,920	42	12	31
30	Buckbee's Illinois	" 27	101	38 " 42	Stiff	6 " 8	"	2,840	41	6	32
31	Black Beauty	" 25	99	35 " 38	"	5 " 8	"	3,000	40	20	32½
32	Mennonite	" 27	101	38 " 42	"	5 " 7	"	2,800	40	20	33
33	Wide Awake	" 28	102	38 " 42	"	6 " 7	"	2,720	40	0	31
34	Irish Victor	" 27	101	36 " 40	"	5 " 6	"	2,480	40	0	33½
35	Waverley	" 27	101	35 " 38	Medium	5 " 7	"	2,720	38	28	34
36	Abundance	" 27	101	36 " 40	Stiff	6 " 8	"	2,880	38	8	31
37	Sensation	" 25	99	36 " 40	"	6 " 8	"	2,880	37	22	32½

EXPERIMENTS WITH BARLEY.

Eighteen varieties of six-rowed and fourteen varieties of two-rowed barley were sown in uniform plots of one-fortieth acre each, on May 19. The land was a clay loam on which mangels were grown the previous year (1905), for which crop barnyard manure at the rate of twenty one-horse cart loads per acre was used. There was grain on this land in 1903, and hay in 1904. No manure or fertilizer was used for this crop. This land was ploughed in the fall of 1905 and worked up in the spring of 1906, with the spring-tooth and smoothing harrows, and sown with seed selected from the previous year's crop by cutting picked heads at harvest time.

The grain was sown with the seed drill at the rate of 2 bushels per acre, and at the same time there was also sown 7 lbs. Mammoth Red clover, 3 lbs. Alsike clover and

12 lbs. Timothy seed per acre. The grain started very well. There was no rust, but considerable smut. The following yields were obtained:—

SIX-ROWED BARLEY.—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw, including Head	Character of Straw.	Length of Head.	Weight of Straw.	Yield per Acre.		Weight per measured Bushel after cleaning.
				Inches.		Inches.	Lbs.	Bush.	lbs.	Lbs.
1	Odessa	Aug. 20	93	40 to 44	Stiff	2 to 2½	3,440	45	..	47¼
2	Mensury	" 21	94	38 " 41	Medium	2 " 3	3,280	43	16	48
3	Oderbuch	" 20	93	36 " 40	"	2 " 2½	3,320	42	44	49
4	Common	" 20	93	38 " 42	"	2 " 3	3,800	42	24	49½
5	Blue Long Head	" 21	94	36 " 40	Stiff	2 " 2¼	3,120	40	..	43
6	Albert	" 20	93	38 " 42	"	2 " 2½	3,480	39	8	52
7	Argyle	" 20	93	40 " 44	"	2 " 2½	3,720	38	16	49
8	Royal	" 22	95	38 " 42	"	2 " 2½	3,240	38	16	51
9	Claude	" 22	95	40 " 43	"	2 " 2½	3,600	38	16	50
10	Summit	" 25	98	37 " 41	"	2 " 2½	3,840	36	32	51
11	Empire	" 23	96	38 " 42	"	2 " 3	3,200	35	40	50½
12	Mansfield	" 21	94	43 " 46	"	2 " 3	3,360	35	20	49½
13	Stella	" 25	98	36 " 40	"	2 " 2½	4,240	34	8	51
14	Trooper	" 22	95	40 " 43	"	2 " 2½	2,920	33	16	50½
15	Yale	" 21	94	42 " 46	"	2 " 3	2,920	32	24	50
16	Brome	" 22	95	36 " 40	"	2 " 2½	3,000	30	20	49
17	Nugent	" 22	95	37 " 41	"	2 " 2½	2,880	27	44	50
18	Champion	" 18	91	43 " 47	Medium	2 " 3	2,640	25	40	45½

TWO-ROWED BARLEY—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw, including Head	Character of Straw.	Length of Head.	Weight of Straw.	Yield per Acre.		Weight per measured Bushel after cleaning
				Inches.		Inches.	Lbs.	Bush.	lbs.	Lbs.
1	Danish Chevalier	Aug. 24	97	36 to 40	Medium	3 to 4	3,480	51	32	51
2	Swedish Chevalier	" 25	98	36 " 38	"	2½ " 3½	3,080	50	0	50½
3	French Chevalier	" 24	97	37 " 40	"	3 " 4	3,120	46	32	50½
4	Clifford	" 24	97	44 " 48	Stiff	3 " 3½	3,320	44	8	48½
5	Beaver	" 24	97	36 " 40	Medium	3 " 3½	3,200	39	8	51¼
6	Invincible	" 24	97	38 " 42	"	2 " 3	3,180	38	16	50
7	Jarvis	" 24	97	40 " 45	Stiff	2½ " 3	2,600	36	12	51¾
8	Logan	" 24	97	46 " 50	"	3 " 4	3,000	35	0	49¼
9	Gordon	" 24	97	44 " 48	"	2 " 3	2,640	34	28	48
10	Standwell	" 24	97	36 " 40	"	2 " 3	2,520	33	36	49
11	Harvey	" 24	97	45 " 48	"	2 " 3	2,800	32	24	49½
12	Dunham	" 25	98	45 " 50	"	3 " 3½	2,680	30	0	49
13	Sidney	" 25	98	40 " 44	"	2½ " 3	2,440	29	8	50½
14	Canadian Thorpe	" 25	98	38 " 40	"	2 " 3	2,600	25	40	48

EXPERIMENTS WITH SPRING WHEAT.

Sixteen varieties of spring wheat were sown in plots of one-fortieth acre each, on a clay loam soil that had been in mangels the previous season (1905), for which crop 20 one-horse cart-loads of barn-yard manure per acre were used. This land was in grain in 1903 and in hay in 1904. The land was ploughed in the fall of 1905 and in the spring of 1906 was well worked up with the spring-tooth and smoothing harrows, and sown with the drill seeder, May 17th at the rate of 1¾ bushels per acre, together with Mammoth Red clover, 7 lbs.; Alsike clover, 3 lbs.; and Timothy seed, 12 lbs.

The grain made very good growth in the early part of the season, but ripened somewhat prematurely on account of the extreme drought in the latter part of the summer. The straw was clean and no smut or rust was noticed. The following yields were obtained:—

WHEAT—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw including head.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.		Weight per measured bush. after cleaning.
				In.		In.		Lbs.	Bush.	Lbs.	Lbs.
1	Red Fern	Aug. 27	102	47 to 50	Stiff	2½ to 3½	Bearded	4,280	34	0	60
2	Red Fife	" 29	104	45 " 48	"	2½ " 3	Beardless	4,120	33	20	60
3	Bishop	" 28	103	45 " 48	"	2½ " 3	"	4,080	32	40	60
4	White Fife	" 30	105	48 " 50	"	3 " 3½	"	3,320	32	0	61
5	White Russian	" 30	105	47 " 50	"	3 " 3½	"	3,080	31	20	60
6	Colorado	" 24	99	46 " 50	"	2 " 3	Bearded	3,880	30	40	60¾
7	Stanley	" 29	104	44 " 48	"	2 " 3	Beardless	4,200	30	0	60
8	Hungarian White	" 27	102	44 " 46	"	2 " 3	Bearded	3,640	28	20	61¼
9	Preston	" 26	101	42 " 45	"	2½ " 3	"	3,400	28	0	60
10	Herisson Bearded	" 27	102	40 " 45	Medium	1½ " 2	"	3,280	28	0	60½
11	Percy	" 29	104	47 " 50	Stiff	2 " 3	Beardless	3,600	27	40	59
12	Pringle's Champlain	" 24	99	45 " 48	"	2½ " 3½	Bearded	3,200	27	20	61
13	Huron	" 27	102	40 " 46	"	2½ " 3	"	3,320	27	20	61½
14	Riga	" 30	105	44 " 47	"	2 " 3	Beardless	3,040	27	0	61
15	Haynes' Blue Stem	" 26	101	42 " 47	"	2 " 3	"	2,960	27	0	60
16	Laurel	" 30	105	46 " 46	"	2½ " 3½	"	2,880	26	40	59

EXPERIMENTS WITH DURUM OR MACARONI WHEAT.

Four varieties of Durum wheat were grown in plots of one-fortieth acre each, alongside of the other wheat plots. The land was similar in character and received the same treatment as in the spring wheat plots and was sown May 18. Following are the yields obtained:—

MACARONI WHEAT—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw including head.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.		Weight per measured bush. after cleaning.
				In.		In.		Lbs.	Bush.	Lbs.	Lbs.
1	Goose	Aug. 27	101	40 to 45	Stiff	1½ to 2	Bearded	3,480	22	40	63
2	Roumanian	" 28	102	42 " 46	"	2 " 2½	"	3,200	22	0	62½
3	Yellow Gharnovka	" 28	102	40 " 45	"	2 " 2½	"	2,880	20	40	62
4	Mahmoudi	" 28	102	34 " 38	"	1½ " 2	"	2,800	18	40	61

EXPERIMENTS WITH EMMER AND SPELT.

Two varieties each of Emmer and Spelt were sown May 14, in plots of one-fortieth acre each. The land was similar to that on which the other spring wheats were sown and received the same treatment. The yield from these plots is given in

Experimental Farm, Nappan, Nona Scotia, showing group of sample hedges.

pounds, as with the ordinary threshing the chaff is not separated from the kernels and cannot well be compared with the other sorts of wheat which are threshed clean. Following are the yields obtained:—

EMMER AND SPELT—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No of Days Maturing.	Length of Straw including head	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.
				In.		In.		Lbs.	Lbs.
1	White Spelt	Sept. 5	110	38—42	Stiff	3 to 4	Bearded	4,920	2,120
2	Red Spelt	" 5	110	40—44	"	2 to 3	"	4,120	1,880
3	Common Emmer	Aug. 28	102	36—40	Medium	1½ to 2	"	3,800	1,760
4	Red Emmer	Sept. 5	110	34—36	Stiff	1½ to 2¼	"	3,520	1,040

EXPERIMENTS WITH PEASE.

Twenty-four varieties of pease were sown in uniform plots of one-fortieth acre each on a clay loam soil that had been in roots the previous year (1905). The land was ploughed in the fall and worked up in the spring with the disc, spring-tooth and smoothing harrows, and sown on May 22 with the seed drill seeder at the rate of from 2 to 3 bushels per acre. This ground was seeded down to clover and Timothy at the rate of 7 lbs. Mammoth Red clover, 3 lbs. Alsike clover and 12 lbs. timothy seed per acre. The following yields per acre were obtained:—

PEASE.—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	Number of Days Maturing.	Character of Growth.	Length of Straw.	Length of Pod.	Size of Pea.	Yield per Acre.		Weight per Bushel.
					Inches.	Inches.		Bush.	Lbs.	Lbs.
1	Paragon	Sept. 9	110	Good	35-40	1½-2	Medium	35	20	64
2	Prince	" 9	110	Medium	34-37	2 -2½	Large	30	0	62¼
3	Prince Albert	" 7	108	"	32-36	1½-2	Small	29	20	64
4	Victoria	" 9	110	Good	33-38	2 -2½	Medium	28	40	63
5	Early Britain	" 7	108	"	36-40	2 -3	Large	28	0	62½
6	Gregory	" 6	107	"	33-38	2 -2½	Medium	26	0	64½
7	Pearl	" 7	108	Medium	33-36	2 -2½	"	24	40	63
8	White Marrowfat	" 5	106	Good	34-38	2 -3	Large	24	0	63½
9	Duke	" 5	106	"	36-40	2 -2½	"	23	0	64
10	Wisconsin Blue	" 4	105	"	33-38	1½-2	Medium	22	40	65
11	Golden Vine	" 5	106	"	33-38	1½-2	Small	22	0	65½
12	Black Eyed Marrowfat	" 7	108	Medium	35-38	2 -3	Large	20	20	64
13	Picton	" 7	108	"	32-36	2 -2½	"	20	0	63½
14	Mackay	" 5	106	"	33-36	2 -2½	Medium	19	20	64
15	Daniel O'Rourke	" 3	104	"	30-34	1½-2	Small	19	0	65
16	Prussian Blue	" 4	105	"	35-36	2 -2½	Medium	19	0	64½
17	Nelson	" 5	106	"	30-34	2 -2½	"	18	40	64½
18	Archer	" 4	105	"	30-36	2 -3	Large	18	40	65
19	Chancellor	" 3	104	"	30-35	1½-2	Small	18	0	65½
20	Arthur	" 4	105	"	28-34	2 -2½	Medium	17	20	64
21	Agnes	" 5	106	"	30-36	2 -3	Large	16	40	64
22	Kent	" 6	107	"	34-38	2 -3	"	16	40	64
23	White Wonder	" 3	104	"	30-33	2 -2½	Medium	15	20	64
24	English Grey	" 4	105	"	30-36	2 -2½	"	14	40	63

EXPERIMENTS WITH BUCKWHEAT.

Five varieties of buckwheat were sown in uniform test plots of one-fortieth ac each. They were sown on June 18 and cut September 5. The land was a clay loa that had been in roots the previous year. The land had received a dressing of barı yard manure in 1902, when a crop of roots was grown. No fertilizer of any kind wa used since. The land was ploughed in the fall and well worked up in the spring. Th following yields were obtained:—

BUCKWHEAT—TEST OF VARIETIES.

Number.	Name of Variety.	Character of Soil.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Length of Straw including Head.	Yield per Acre.		Weight per measure Bushel after cleaning
						Inches.	Bush.	Lbs.	Lbs.
1	Rye Buckwheat...........	Clay loam	June 18	Sept. 5	79	35—40	26	32	4
2	Silver hull............	"	" 18	" 5	79	48—42	26	12	4
3	Tartarian or Siberian......	"	" 18	" 5	79	35—37	25	40	48
4	Grey.....................	"	" 18	" 5	79	35—40	25	20	4
5	Japanese	"	" 18	" 5	79	36—40	22	24	4

FIELD CROPS OF GRAIN.

Thirteen and one-half acres of field grain were grown, eleven acres of which wer in plots of one acre each, one two-acre plot and one one-half acre plot. The land wa a clay loam, the previous crop having been roots and corn, for which crop barnyar manure at the rate of 20 tons per acre had been used. The land was ploughed in th fall of 1905 and well worked up in the spring of 1906, after which the grain wa sown with the seed-drill with 3 bushels in the case of oats, 2 bushels in the case o barley and 3 bushels in the case of mixed grain per acre. Mammoth Red clover a the rate of 7 lbs., Alsike clover, 3 lbs., and Timothy seed, 12 lbs. per acre were sow with this crop. The crop harvested was as follows:—

FIELD CROPS OF GRAIN.

Crops.	Yield per Acre.		Weight pe Bushel.
	Bush.	Lbs.	Lbs.
1 Acre Mixed Grain sown May 19, cut Aug. 30..................	41	20	40
1 " Waverley Oats " " 19, " " 30..................	42	30	35
1 " Mixed Grain " " 19, " " 30..................	43	15	40
1 " Black Tartarian Oats " " 19, " " 30..................	45	0	37
1 " Mixed Grain " " 19, " " 30..................	42	40	40
1 " Odessa Barley " " 21, " " 23.................	29	0	48
1 " Mixed Grain " " 21, " " 27.................	48	20	40
½ " Sensation Oats " " 21, " " 27..................	50	0	36
7 " Mixed Grain " June 18, " Sept. 18..................	41	6	40
1 " Odessa Barley " " 20, " " 5..................	25	12	48
1 " French Chevalier Barley " " 20, " " 7..................	32	24	48
1 " Waverley Oats " " 20, " " 19..................	34	17	35
1 " Pioneer Oats " " 20, " " 19..................	32	25	38
2 " Mixed Grain " " 20, " " 19..................	47	10	40

FIELD CROPS OF MIXED GRAIN.

Seven acres also were sown with mixed oats, barley and pease. The land was a clay loam, the previous crop being clover hay, the aftermath being ploughed under in the fall. No fertilizer was used for this crop. It was sown June 18 and cut September 18. The yield was 41 bushels 6 lbs. per acre, weighing 40 lbs. per bushel.

EXPERIMENTS WITH INDIAN CORN.

Twenty-three varieties of Indian corn were sown in rows 36 inches apart and also in hills 36 inches apart each way. The land was a clay loam, the previous crop having been clover hay. Stable manure at the rate of 20 loads per acre was spread on in the fall of 1905 and ploughed under together with the crop of grass in the spring of 1906. Early in June, just before planting, this was worked into a good condition of tilth, when a complete fertilizer at the rate of 300 lbs. per acre was sown broadcast and harrowed in.

The corn was planted June 8 by hand machine. When the plants were about 6 inches high they were thinned out, leaving them from 4 to 6 inches apart where in rows and from 3 to 6 plants per hill, where in hills. The land was gone over with a very light harrow before the plants came up and four times with the cultivator during the next four weeks. From the first this crop made satisfactory growth. The following yields were obtained:—

CORN—TEST OF VARIETIES.

Number.	Name of Variety.	Height.	Leafiness.	When Tasselled.	In Silk.	Condition when cut.	Weight per Acre grown in rows.		Weight per Acre grown in hills.	
		Inches.					Tons.	Lbs.	Tons.	Lbs.
1	Early Mastodon	106	Medium	Aug. 29	Sept. 7	Watery	25	600	19	1,380
2	Thoroughbred White Flint	94	"	" 27	" 15	"	25	160	17	1,750
3	Angel of Midnight	86	Leafy	" 15	Aug. 27	Soft glazed.	24	1,500	16	1,550
4	Eureka	108	Fair	Sept. 5	....	"	23	1,850	18	850
5	Early Leaming	96	"	Aug. 27	Sept. 7	Watery	22	550	17	100
6	Evergreen Sugar	96	"	" 27	" 20	"	22	330	19	500
7	Compton's Early	86	Leafy	" 15	Aug. 27	Soft glazed.	21	900	17	100
8	Champion White Pearl	90	Fair	" 29	Sept. 15	Watery	21	20	18	300
9	North Dakota White	84	Leafy	" 17	" 1	Soft glazed.	20	1,800	20	1,470
10	Giant Prolific Ensilage	100	"	" 30	" 20	Watery	20	1,800	15	1,350
11	Selected Leaming	100	Medium	" 27	" 5	"	20	1,250	19	170
12	Cloud's Early Yellow	108	"	Sept. 5	....	Silking	20	920	20	150
13	Longfellow	87	"	Aug. 15	Aug. 27	Soft glazed.	19	1,600	18	1,950
14	Red Cob Ensilage	104	Fair	" 31	Sept. 15	Watery	19	1,270	12	750
15	Early Butler	94	"	" 29	" 10	"	19	170	17	1,200
16	Superior Fodder	96	"	Sept. 5	....	....	18	1,950	18	1,400
17	Early Longfellow	80	Leafy	Aug. 15	Aug. 29	Soft glazed.	18	1,950	17	650
18	White Cap Yellow Dent	96	Fair	" 22	Sept. 5	Watery	18	1,400	15	580
19	Mammoth Cuban	96	"	" 29	" 8	"	18	850	13	950
20	Pride of the North	104	"	Sept. 5	....	....	17	1,700	14	1,150
21	Salzer's All Gold	96	Leafy	Aug. 31	Sept. 15	Watery	17	650	13	1,500
22	Wood's Northern Dent	90	"	" 29	" 15	"	16	450	18	1,400
23	King Philip	80	"	" 20	" 1	Soft glazed.	15	1,900	16	1,330

FIELD CROP OF INDIAN CORN.

Three acres of Indian corn were grown in four plots, two plots of one acre each and two plots of one-half acre each. The land was a clay loam, the previous crop being clover hay. The land was manured in the fall and early winter at the rate of 20 tons per acre, and ploughed under early in June along with the growth of grass. The ground was well worked up with the spade and smoothing harrows. The varieties known as Longfellow and Angel of Midnight were used for these plots—one acre of each and one-half acre of each.

The acre plot of Longfellow had manure only, the half acre plot had 300 lbs. per acre of commercial fertilizer added. The acre plot of Angel of Midnight had manure only, the half acre had 300 lbs. per acre of bone meal added. The corn was sown in rows 35 inches apart with the drill seeder on June 8. The land was gone over once with a light smoothing-harrow before the corn came up and cultivated with the one-horse cultivator four times during the summer. The crop made very satisfactory growth. The following table shows the results:—

FIELD CROP OF CORN.

Name of Variety, How Fertilized, Size of Plot.		Yield per Acre.	
Longfellow (Cut Oct. 6 to 8).		Tons.	Lbs.
½ acre—Manure, 20 loads; fertilizer, 300 lbs. per acre		16	1,100
1 " " only		15	1,500
Cost of commercial fertilizer, 300 lbs. at $30 per ton	$ 4 50		
Value of gain in crop over manure only 1 ton, 400 lbs. per acre at $2 per ton	2 40		
Loss per acre	$ 2 10		
Angel of Midnight (Cut Oct. 4 and 5).			
½ acre—Manure, 20 loads; fertilizer, bone meal, 300 lbs. per acre		15	1,050
1 " " only		15	500
Cost of commercial fertilizer, 300 lbs. at $30 per ton	$ 4 50		
Value of gain in crop over manure only, 550 lbs. per acre at $2 per ton	0 55		
Loss per acre	$ 3 95		

EXPERIMENTS WITH TURNIPS.

Twenty varieties of turnips were sown this year on a clay loam soil that had been in clover the previous year.

The ground was ploughed early in the fall and harrowed once with the spring-tooth harrow. In the spring this was again cultivated with spade and spring-tooth harrow. Barnyard manure was then spread on with the manure spreader at the rate of 20 tons per acre, and ploughed under and again thoroughly cultivated. Complete fertilizer at the rate of 500 lbs. per acre was then sown broadcast and harrowed in with the smoothing harrow. Rows were made 24 inches apart, and the plants thinned out to one foot apart in the rows. This crop made a very satisfactory growth for a time, but continued dry weather in the latter part of the season materially reduced the prospective crop.

The yield was calculated from the weight obtained from two rows each 66 ft. long. The first plots were sown June 16, and duplicate lots sown June 30, and all pulled October 24.

TURNIPS—TEST OF VARIETIES.

Number.	Name of Variety.	Yield per acre.							
		1st Plot.				2nd Plot.			
		Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
1	New Century	30	166	1,002	40	24	1,120	818	40
2	Jumbo	30	..	1,000	..	25	880	848	..
3	Kangaroo	28	1,840	977	20	21	1,520	725	20
4	Hartley's Bronze	27	240	904	..	25	1,680	861	20
5	Imperial Swede	26	1,600	893	20	24	800	813	20
6	Hall's Westbury	26	1,440	890	40	24	..	800	..
7	Perfection Swede	26	800	880	..	23	80	768	..
8	Halewood's Bronze Top	26	320	872	..	21	880	714	40
9	Drummond Purple Top	26	160	869	20	21	1,140	717	20
10	Sutton's Champion	25	400	840	..	23	400	773	20
11	Magnum Bonum	24	1,600	826	40	16	1,600	560	..
12	Mammoth Clyde	24	1,280	821	20	25	720	845	20
13	Good Luck	23	1,680	794	40	21	1,360	722	40
14	Elephant's Master	23	1,040	784	..	22	1,760	762	40
15	Empire Swede	23	560	776	..	22	800	746	40
16	Selected Purple Top	22	1,600	760	..	18	1,760	629	20
17	Carter's Elephant	22	..	733	20	22	1,160	752	..
18	Skirvings	21	1,200	720	..	21	720	712	..
19	Bangholm Selected	21	400	706	40	17	560	576	..
20	East Lothian	20	1,920	698	40	19	1,360	656	..

FIELD CROPS OF TURNIPS.

Four acres of turnips were sown in four lots of one acre each. The land was a clay loam in a fair state of fertility, the previous crop having been clover hay. The sod was ploughed in the fall and harrowed with the spring-tooth harrow and worked up in the spring with the spade and smoothing harrows. Manure at the rate of 20 tons per acre was spread on and ploughed under.

Three of the four acres were divided into three parts. To one-third of two of those acres was added complete fertilizer (Bowker's Square brand) at the rate of 500 lbs. per acre, to another third complete fertilizer (Bowker's Square brand) at the rate of 250 lbs. per acre was added, the remaining third of each had manure only. To one-third of the third acre Basic slag at the rate of 1,000 lbs. per acre was added, to another third basic slag at the rate of 500 lbs. per acre was added, the remaining third had manure only. The fourth acre had barnyard manure only.

The fertilizer was put on top of rows and drilled in, the rows were run 24 inches apart and the seed sown on June 16, 21 and 28. The crop was harvested November 14, 15 and 17.

The following are the yields obtained:—

FIELD CROPS OF TURNIPS.

Name of Variety, How Fertilized, Size of Plot.		Yield per Acre.		Yield per Acre.	
		Tons.	Lbs.	Bush.	Lbs.
Kangaroo (Pulled October 26).					
⅓ acre—manure and fertilizer, 500 lbs. per acre		29	1,996	999	56
⅓ " " 250 "		28	1,264	954	24
⅓ " only		27	1,156	919	16
Cost per acre of 500 lbs. fertilizer at $30 per ton	$7 50				
Value per acre of gain in crop over manure only, 80 bush. 40 lbs. at 6 cts	4 84				
Loss per acre	$2 66				
Cost per acre of 250 lbs. fertilizer at $30	3 75				
Value per acre of gain in crop over manure only, 35 bush. 8 lbs. at 6 cts	2 11				
Loss per acre	$1 64				
Hartley's Bronze Top (Pulled November 14).					
⅓ acre—manure and fertilizer, 500 lbs per acre		29	1,026	983	46
⅓ " " 250 "		29	146	969	6
⅓ " only		28	900	948	20
Cost per acre of 500 lbs. fertilizer at $30	$7 50				
Value per acre of gain in crop over manure only, 35 bush. 26 lbs at 6 cts	2 13				
Loss per acre	$5 37				
Cost per acre of 250 lbs. fertilizer at $30	$3 75				
Value per acre of gain in crop over manure only, 20 bush. 46 lbs. at 6 cts	1 25				
Loss per acre	2 50				
Rennie's Purple Top (Sown June 21, pulled November 15.)					
⅓ acre—manure and Basic slag, 1,000 lbs. per acre		29	524	975	24
⅓ " " " 500 "		28	796	946	36
⅓ " only		27	60	901	..
Cost per acre of 1,000 lbs. Basic slag at $20	$10 00				
" " gain in crop over manure only, 74 bush. 24 lbs. cts	4 46				
Loss per acre	$5 54				
Cost per acre of 500 lbs. Basic slag at $20	5 00				
" " gain in crop over manure only, 28 bush. 48 lbs. at 6 cts	1 73				
Loss per acre	$3 27				
Mixed Kangaroo, Hartley's Bronze and Rennie's Purple Top. (Sown June 28, pulled November 17).					
1 acre—manure only		25	160	876	..

EXPERIMENTS WITH MANGELS.

Sixteen varieties of mangels were sown in uniform test plots. The land was a clay loam, the previous crop being clover hay. It was ploughed early last fall and a light crop of aftermath turned under, and cultivated in the spring. Barnyard manure at the rate of 20 tons per acre was spread on with the manure spreader and ploughed under and cultivated again. Complete fertilizer at the rate of 500 lbs. per acre was then sown broadcast and harrowed in with the smoothing harrow. The rows were made 24 inches apart, raked down and sown with the Planet Jr. hand seed drill in bunches 12 inches apart in the rows and from 4 to 8 seeds in each bunch. When about 3 to 4 inches high they were thinned out, leaving one plant in each spot. Two sowings were made of each variety, the first on June 14 and the second on June 28. This crop made very unsatisfactory growth, evidently owing to the lateness of the sowing and the extreme drought in the latter part of the season. The mangels were all pulled October 17. The yield was calculated in each case from the weight of roots gathered from two rows, each 66 feet long. The following are the results obtained:—

MANGELS.—TEST OF MANGELS.

Number.	Name of Variety.	Yield per acre.							
		1st plot.				2nd plot.			
		Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
1	Yellow Intermediate	19	940	649	0	19	1,930	665	30
2	Half Long Sugar White	19	280	638	0	15	1,020	517	..
3	Selected Yellow Globe	18	960	616	0	17	815	580	45
4	Mammoth Long Red	18	465	607	45	17	650	577	30
5	Mammoth Yellow Intermediate	17	1,145	585	45	15	295	504	45
6	Prize Winner Yellow Globe	16	1,990	566	30	16	670	544	30
7	Prize Mammoth Long Red	16	1,495	558	15	15	360	506	..
8	Lion Yellow Intermediate	16	670	544	30	13	1,720	462	..
9	Leviathan Long Red	15	855	514	15	14	1,865	497	45
10	Triumph Yellow Globe	14	1,700	495	0	12	905	415	15
11	Half Long Sugar Rosy	14	1,205	486	45	13	730	445	30
12	Selected Mammoth Long Red	13	1,720	462	0	13	1,225	453	45
13	Gate Post	13	1,555	459	15	14	1,865	497	45
14	Giant Yellow Globe	13	730	445	30	14	1,040	484	..
15	Giant Sugar	13	565	442	45	13	235	437	15
16	Giant Yellow Intermediate	13	235	437	15	13	400	440	..

FIELD CROP OF MANGELS.

Three varieties of mangels were grown, Yellow Globe, Yellow Intermediate and Mammoth Long Red in three plots of 3/20 acre each. The land was a clay loam in a good state of fertility, the previous crop having been clover hay. The sod was ploughed in the early fall and worked up with the spade harrow. In the spring it was again well worked up and barnyard manure at the rate of 20 tons to the acre was spread on with the manure spreader, ploughed under and well worked up. To one-third of each plot was added complete fertilizer (Bowker's Square brand) at the rate of 500 lbs. per acre; to another third at the rate of 250 lbs. per acre, and one-third left with manure alone.

The mangels were sown in drills 24 inches apart. They were sown June 16 and harvested Octover 20 to 24. The following are the yields obtained:—

FIELD CROP OF MANGELS.

Name of Variety, how Fertilized, Size of Plot.		Yield per Acre.		Yield per Acre.	
		Tons.	Lbs.	Bush.	Lbs.
Yellow Globe—(Pulled October 20).					
$\frac{1}{20}$ acre—manure and fertilizer, 500 lbs. per acre		24	1,100	818	20
$\frac{1}{20}$ " " " 250 "		24	200	803	20
$\frac{1}{20}$ " " only		22	1,100	751	40
Cost per acre of 500 lbs. fertilizer at $30 per ton	$7 50				
Value per acre in gain of crop over manure only, 66 bush. 40 lbs. at 6 cts	4 00				
Loss per acre	$3 50				
Cost per acre of 250 lbs. fertilizer at $30 per ton	$3 75				
Value per acre in gain of crop over manure only, 51 bush. 10 lbs. at 6 cts	3 10				
Gain per acre	$0 65				
Yellow Intermediate—(Pulled October 22).					
$\frac{1}{20}$ acre—manure and fertilizer, 500 lbs. per acre		22	500	741	40
$\frac{1}{20}$ " " " 250 "		20	1,400	690	..
$\frac{1}{20}$ " " only		20	1,500	691	40
Cost per acre of 500 lbs. fertilizer at $30 per ton	$7 50				
Value per acre of gain in crop over manure only, 50 bush. at 6 cts	3 00				
Loss per acre	$4 50				
Cost per acre of 250 lbs. fertilizer at $30 per ton	$3 75				
Value per acre of loss in crop over manure only, 1 bush. 40 lbs. at 6 cts	0 10				
Loss per acre	$3 65				
Mammoth Long Red—(Pulled October 22).					
$\frac{1}{20}$ acre—manure and fertilizer, 500 lbs. per acre		22	1,500	758	20
$\frac{1}{20}$ " " " 250 "		20	1,700	695	..
$\frac{1}{20}$ " " only		19	1,000	650	..
Cost per acre of 500 lbs. fertilizer at $30 per ton	$7 50				
Value per acre of gain in crop over manure only, 108 bush. 20 lbs. at 6 cts	6 50				
Loss per acre	$1 00				
Cost per acre of 250 lbs. fertilizer at $30 per ton	$3 75				
Value per acre of gain in crop over manure only, 45 bush. at 6 cts	2 70				
Loss per acre	$1 05				

EXPERIMENTS WITH CARROTS.

Ten varieties were sown in uniform test plots. Two sowings were made of each sort, the first on June 14, and the second on June 28, in rows 24 inches apart, and thinned to about 3 inches apart in the rows. The ground was similar to that used for the mangel plots and received the same treatment. The crop was pulled October 20, and the yield calculated from the weight of roots taken from two rows each 66 feet long. The following table gives the yield per acre obtained:—

CARROTS—TEST OF VARIETIES.

Number.	Name of Variety.	Yield per acre.							
		1st Plot.				2nd Plot.			
		Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
1	New White Intermediate	15	1,515	525	15	11	935	352	15
2	White Belgian	13	70	434	30	9	1,800	330	..
3	Ontario Champion	12	420	407	..	8	995	283	15
4	Half Long Chantenay	10	995	349	15	9	975	316	15
5	Long Yellow Stump-rooted	10	625	343	45	10	130	335	30
6	Giant White Vosges	10	460	341	..	8	5	266	45
7	Carter's Orange Giant	10	130	335	30	8	1,325	288	45
8	Early Gem	9	1,305	321	45	11	1,430	390	30
9	Improved Short White	9	150	302	30	7	850	247	30
10	Mammoth White Intermediate	8	665	277	45	8	1,490	291	30

EXPERIMENTS WITH SUGAR BEETS.

Eight varieties of sugar beets were sown. The land was similar to that on which the mangels were sown and received the same treatment. Two sowings were made of each sort, the first on June 14 and the second on June 28. The seed was sown in rows 24 inches apart, in bunches 12 inches apart in the rows. When the plants were about 3 to 4 inches high, the bunches were thinned out to one plant in each place. The whole crop was harvested on October 20 and the yield calculated from the weight obtained from two rows, each 66 feet long. The following are the results:—

SUGAR BEETS—TEST OF VARIETIES.

Number.	Name of Variety.	Yield per acre.							
		1st Plot.				2nd Plot.			
		Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
1	Danish Improved	13	1,225	453	45	12	90	401	30
2	Improved Imperial	12	1,410	423	30	10	130	335	30
3	Danish Red Top	11	1,430	390	30	11	1,100	385	..
4	French Very Rich	11	605	376	45	8	1,325	288	45
5	Royal Giant	10	295	338	15	12	55	400	55
6	Red Top Sugar	9	975	316	15	10	1,450	357	30
7	Vilmorin's Improved	8	1,490	291	30	7	25	233	45
8	Wanzleben	8	830	280	30	9	810	313	30

EXPERIMENTS WITH POTATOES.

Thirty-two varieties were included in this test. The land on which the potat were grown was a clay loam which was in clover hay the previous year. The grou was manured early in the fall with stable manure at the rate of 20 one-horse ca loads per acre, and ploughed under. In the spring this was well worked up with spade and spring-tooth harrows, ploughed and again worked up. Rows were run inches apart and about 4 inches deep and potato fertilizer at the rate of 400 lbs. acre scattered along the rows before planting. The sets were dropped one foot ap in the rows and covered with the drill plough. The tubers were cut so as to have fr 2 to 3 eyes in each set. The drills were harrowed down once before the plants w above the ground, and again drilled up in a few days and the soil kept loose w the cultivator until the vines were quite large. The plots were sprayed with Bordea mixture and Paris green three times, July 18, August 1 and August 22.

There was no blight and no rot, but a little scab, not quite as much as the previ year. The potatoes were planted June 13 and dug October 12. The yield per acre been calculated from two rows each 66 feet long and 30 inches wide.

POTATOES—TEST OF VARIETIES.

Number.	Name of Variety.	Yield per acre.						Form and Colour.
		Total.		Market-able.		Unmarket-able.		
		Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	
1	Vermont Gold Coin	503	48	420	12	83	36	Oval, white.
2	Sabean's Elephant	426	48	332	12	94	36	Long, "
3	State of Maine	422	24	356	24	66	..	Round, "
4	Dooley	420	72	363	..	57	12	Flat, round, white.
5	Carman No. 3	418	..	358	36	59	24	" "
6	Carman No. 1	396	..	345	24	50	36	" "
7	Ashleaf Kidney	387	12	321	12	66	..	
8	Vick's Extra Early	385	..	319	..	66	..	Long, white.
9	Early Envoy	380	36	286	..	94	36	Oblong, pink.
10	Uncle Sam	369	36	303	36	66	..	" white.
11	Irish Cobler	367	24	279	24	88	..	Round, "
12	Rochester Rose	358	36	235	24	123	12	Oblong, dark pink.
13	Pearce	356	24	275	..	81	24	" white.
14	Money Maker	356	24	259	36	96	48	Long, "
15	Empire State	343	12	257	24	85	48	" "
16	Late Puritan	341	..	231	..	110	..	" "
17	Early Rose	336	36	255	12	81	24	" pink.
18	Canadian Beauty	336	36	242	..	94	36	" "
19	Burnaby Mammoth	334	24	286	..	48	24	" "
20	Country Gentleman	330	..	246	24	83	36	Oblong, pink.
21	Early White Prize	330	..	220	..	110	..	Long, white.
22	American Wonder	323	24	244	12	79	12	" "
23	I. X. L	321	12	246	24	74	48	" pink.
24	Bovee	297	..	220	..	77	..	Oblong, "
25	Morgan Seedling	297	..	198	..	99	..	" "
26	Pingree	297	..	213	24	83	36	Long, white.
27	Everett	286	..	176	..	110	..	Round, flat, white.
28	Dalmeny Beauty	281	36	191	24	90	12	" white.
29	Holborn Abundance	281	36	187	..	94	36	" "
30	Dreer's Standard	266	12	187	..	79	12	" "
31	Reeve's Rose	248	36	138	36	110	..	Dark, pink.
32	Maule's Thoroughbred	242	..	165	..	77	..	Long, pink.

EXPERIMENTS WITH BEANS.

Two varieties of beans were sown with a view to test their relative value as a fodder plant, Common Soja beans and Horse beans (Tick variety). These plots were sown June 29 and cut October 8. The following yields were obtained from plots of one-twentieth acre each.

Variety.	Yield per Acre.	
	Tons.	Lbs.
Soja Beans (green)	6	1,800
Horse Beans (green)	12	1,800

EXPERIMENTS WITH MILLET.

Five varieties of millet were grown in plots of one-fortieth acre each. The land was a heavy clay loam in a poor state of fertility, not having had any manure for some years. The ground was ploughed in the fall and well worked up in the spring and sown June 29. The crop was cut October 9. The following yield was obtained, cut green:—

Variety.	Yield per Acre.	
	Tons.	Lbs.
Algerian	6	1,600
Moha Hungarian	4	200
Italian	3	80
Pearl or Cat-tail	2	1,200
White Round French	2	1,080

CLOVER EXPERIMENTS.

Experiments were again conducted this season to determine the gain, if any, from growing clover with grain crops for the purpose of ploughing under the growth of clover made during the season for the benefit of future crops. The ground was the same land as that on which similar clover experiments were carried on last season. The soil was a clay loam in a fair state of fertility. Three kinds of grain in twelve plots of one-fortieth acre each were grown, and each of these series of plots was treated the same. Six plots were seeded down at the time the grain was sown, June 16, and six plots with grain alone without clover. These plots were sown in a similar manner last season, and those seeded to clover this year had been seeded to clover the previous season also, and those not seeded to clover this year had not been seeded to clover the previous year. No fertilizer has been used for years except the clover turned under. The two previous years had a particularly light crop each year, both seasons being unsuited to clover growing.

CLOVER EXPERIMENTS.

Number.	Name of Variety and how Seeded.	Yield per Acr	
		Bush.	L
	Wellman's Fife Wheat—(Sown June 16. Cut Sept. 21).		
1	Without clover	25	2
2	With clover	28	4
3	Without clover	24	2
4	With clover	30	2
	Odessa Barley—(Sown June 16. Cut Sept. 5).		
1	Without clover	15	4
2	With clover	15	
3	Without clover	16	1
4	With clover	17	2
	Pioneer Oats—(Sown June 16. Cut Sept. 18).		
1	Without clover	23	1
2	With clover	26	1
3	Without clover	26	1
4	With clover	28	

EXPERIMENTS WITH DOG-FISH SCRAP.

This experiment was carried on with a view to gain information as to the val of Dog-fish scrap as a fertilizer. Eight plots of one-fortieth acre each were used.

The soil was a clay loam in a good state of fertility, well worked up and so June 27. On account of the delay in getting the Dog-fish scrap, which was receiv June 27, it was considered best to use barley for this experiment, Common six-row being used.

To No. 3, 4 and 5 was added different amounts of commercial fertilizer, while N 1, 2 and 6, no other fertilizer was used. Nos. 6 and 7 were check plots. The crop w harvested September 17. The following were the results obtained:—

EXPERIMENTS WITH DOG-FISH SCRAP.

Number.	Fertilizer.	Amount per Acre.	Yield per acre.		
			Straw.	Grain.	
		Lbs.	Lbs.	Bush.	L
1	Dog-fish scrap	200	3,600	45	4
2	Dog-fish scrap	400	4,600	58	1
3	Dog-fish scrap	400	....	....	....
	Superphosphate	200	4,120	49	0
	Muriate of potash	100	....	....	....
4	Dog-fish scrap	400	....	....	....
	Superphosphate	200	4,280	55	4
5	Dog-fish scrap	400	....	....	....
	Muriate of potash	100	4,080	51	3
6	Dog-fish scrap	800	4,040	56	1
7	Check	....	4,800	60	0
8	Check	....	4,400	56	3

EXPERIMENTS WITH LIME AND COMMERCIAL FERTILIZERS ON MARSH AND DYKE LANDS.

The soil on which this experiment was carried on was what is considered sandy marsh, ploughed the previous fall and well worked up at seeding time with the spade, spring-tooth and smoothing harrows. This was sown broadcast, and seeded with clover and timothy. The fertilizer was harrowed in. The lime was air-slaked and sown on the surface.

The clover take was good, particularly on the plots on which lime was sown. The following table shows the fertilizers used and the yields obtained. The plots were $\frac{1}{10}$ acre each and the grain used was Waverley oats.

Experiments with Fertilizers on Marsh Land.

Size of Plots, $\frac{1}{10}$ Acre each.	Fertilizers per acre.	Yield per Acre.	
No.		Bush.	lbs.
1	3 casks lime and 800 lbs. Basic Slag	39	06
2	3 „ „ 400 „ Bone meal	37	26
3	3 „ only	28	02
4	3 „ and 400 lbs. Bowker fertilizer (Square Brand)	30	02
5	No lime, 800 lbs. Basic Slag	31	14
6	„ 400 „ Bone meal	30	30
7	Check. No fertilizer used	26	28
8	No lime, 400 lbs. Bowker fertilizer (Square Brand)	23	32
9	6 casks lime and 800 lbs. Basic Slag	34	24
10	6 „ „ 400 „ Bone meal	37	14
11	6 „ only	33	18
12	6 „ and 400 lbs. Bowker fertilizer (Square Brand)	38	28

SPECIAL EXPERIMENTS WITH FERTILIZERS.

Experiments having been carried on for 5 years previous to 1904, without any change of fertilizer per plot for the entire period, it was decided to discontinue the use of fertilizer with a view to determine to what extent the fertilizers already applied would continue to supply plant food for the crop. The field was seeded to grain two series of plots each, oats, barley, wheat, pease, and mixed grain. Each series running across the various plots where different fertilizers had been used. With each kind of grain was sown Mammoth Red clover at the rate of 10 lbs. per acre, on the other series of plots the grains were sown alone without clover. This was the third crop since receiving any fertilizer. The ground was ploughed in the spring and cultivated thoroughly. The plots were one-eighth of an acre each. The following yields were obtained from these plots.

SPECIAL EXPERIMENTS WITH FERTILIZERS.

Number.	Fertilizers used each Year per Acre, previous to 1904.	Waverley Oats with Clover.		Waverley Oats without Clover.		Colorado Wheat with Clover.		Colorado Wheat without Clover.		Newton Barley with Clover.		Newton Barley without Clover		Mixed Grain with Clover.		Mixed Grain without Clover.		Golden Vine Pease with Clover.		Golden Vine Pease without Clover.	
		Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.
1	Manure, 30 tons	35	10	38	8	13	20	16	40	10	20	10	20	22	20	30	0	11	40	13	20
2	Manure, 15 tons, fertilizer 250 lbs.	38	8	44	4	15	0	17	20	12	24	12	24	25	0	31	10	16	40	18	20
3	Complete fertilizer, 1,000 lbs.	21	20	27	32	8	20	11	40	11	22	10	20	20	0	28	30	15	0	13	20
4	" " 500 lbs.	22	2	23	8	9	10	8	20	9	18	14	28	27	20	33	30	12	30	10	50
5	Check, no fertilizer used	29	14	25	0	10	0	10	0	8	41	10	20	25	0	28	30	9	10	6	40
6	Bone meal, 1,000 lbs.	27	32	26	16	8	20	10	50	9	18	9	18	28	30	23	30	9	10	8	20
7	" " 500 lbs.	20	20	29	14	10	50	10	0	7	14	9	18	18	30	18	30	10	0	9	35
8	Ashes, 2,500 lbs.	22	2	23	8	8	45	10	25	14	28	13	26	17	20	20	0	10	0	10	0
9	Manure, rotted, 20 tons	35	10	32	12	12	30	11	40	22	14	14	28	31	10	32	20	11	40	10	25
10	Check, no fertilizer used	14	24	20	20	7	55	6	40	8	16	10	20	15	0	17	20	3	45	3	20
11	Land plaster, 500 lbs.	17	22	23	8	10	0	10	50	8	16	10	20	20	0	20	0	6	40	4	10
12	Salt, 500 lbs.	22	2	26	16	11	15	11	40	9	18	11	22	27	10	30	0	8	20	5	0
13	Marsh mud, 100 tons.	32	12	30	30	16	40	14	10	16	32	12	24	32	20	33	30	10	25	7	30
14	Manure, green, 20 tons	44	4	38	8	18	20	16	50	19	13	16	32	42	20	41	10	13	20	12	5

HAY CROP.

The crop of clover and timothy hay on the upland was fairly good this season. Forty-three acres yielded 70 tons 1,265 lbs.

The hay on the marsh was only a fair crop. Forty-two acres yielded 62 tons 480 lbs.

The total hay crop was 132 tons 1,745 lbs.

SUMMARY OF CROPS GROWN EXCLUSIVE OF UNIFORM TEST PLOTS OF GRAIN AND POTATOES.

Grain.

	Total Yield. Bush.	Lbs.	Total Yield. Lbs.
Mixed grain	559	20	22,380
Oats	370	18	12,598
Barley	106	18	5,106
Buckwheat	30	0	1,440
Wheat	16	56	1,016
			42,540

Turnips.

	Bush.	Lbs.	Tons.	Lbs.
Turnips (field crop)	3,741	56	112	516
Turnips (test plots)	194	..	5	1,640
	3,935	56	118	156

Corn.

	Tons.	Lbs.
Corn (field crop)	47	75
Corn (test plots)	7	897
	54	972

Mangels.

	Bush.	Lbs.	Tons.	Lbs.
Mangels (field crops)	328	20	9	1,700
Mangels (test plots)	100	48	3	48
	429	8	12	1,748

GRAIN AND POTATO DISTRIBUTION.

Some of the most promising varieties of grain and potatoes were again distributed this year, free to farmers who made application. The following number of packages of 3 lbs. each were sent out:—

Oats	212
Barley	43
Wheat	100
Pease	40
Buckwheat	17
Potatoes	263
Total	675

HORSES.

No change in the horses has been made in the past year. The present number being eight, consisting of six heavy team horses, one express horse and one driver. One of the older horses has this winter become lame and should be disposed of and replaced by another.

CATTLE.

It will be remembered that when making my last report, November 30, 1905, all of the cattle then on hand had been recently tested with tuberculin, with the result that quite a large percentage had reacted, or were suspicious, and were then under the care of the Veterinary Department. Forty animals including cows, heifers and steers were kept in a building open on the south and east sides and fed outside until May 25, 1906, when by instruction they were shipped to Ottawa to the Veterinary Director General, Dr. J. G. Rutherford. All came through the winter in good condition and no signs of any development of disease were found.

The buildings were then disinfected by being first cleaned thoroughly by sweeping and brushing, so as to dislodge bacteria, and the sweepings taken into the yard and burned. After this cleaning the interior was gone over with water used in a boiling condition, freely with a broom, to each five gallons of which was added one quart of crude carbolic acid. After this had dried the surface of the woodwork was thoroughly sprayed, and particular attention paid to the crevices, with the following solution:—four ounces of corrosive sublimate, and two ounces of chloride of ammonium, pounded finely and mixed together and dissolved in ten gallons of water, the material being entirely dissolved before using. This spraying was reported after a few days and then when dry the whole of the woodwork, walls and ceilings was whitewashed with lime to every five gallons of which had been added one quart of crude carbolic acid. After treatment the buildings were exposed to the air and sunlight for the balance of the summer, the doors and windows having all been removed for that purpose.

Late in November, 1906, fifty grade Shorthorn 2½ and 3½ year old steers were purchased and put in to feed. Up to December 15 no meal was fed. From this date, commencing with 2 lbs. per day per steer for the first two weeks, and increasing from time to time, the average daily meal ration fed per steer has been 3·80.

The total live weight of fifty steers on December 15 being.	48,715 lbs.
Present live weight on March 15..	57,285 "
Increase..	8,570 "
Average daily gain per steer..	1·71 lbs.

Those steers are expected to be ready for sale about May 15.

From the cows that had not reacted at either of the tests made, two pure-bred Holstein cows were selected and removed from any contact with or proximity to any of the other cattle or buildings in which they had been kept. Those two cows are now on hand. Total, 52 head.

SWINE.

The herd at present on the farm consists of:—
One pure bred Yorkshire boar.
Four pure bred Yorkshire sows.

SHEEP.

The flock of sheep at present consists of 25 head as follows:—
1 pure bred Leicester ram.
1 pure bred Leicester ram lamb.
5 pure bred Leicester ewes.
3 pure bred Leicester ewe lambs.
10 pure bred Shropshire ewes.
1 pure bred Shropshire ewe lamb.
3 grade ewes.
1 grade ewe lamb.

POULTRY.

During the year five breeds of poultry were kept: B. P. Rocks, W. Leghorns, W. Wyandottes, Blk. Minorcas and Buff Orpingtons. One hundred and thirty chickens were raised during the year.

A number of young cockerels and pullets have been sold to farmers for breeding purposes and some cockerels fattened and sold. The stock on hand is as follows:—

Breed.	Hens.	Cocks.	Pullets.	Cockerels.
B. P. Rocks..	..	..	16	5
W. Wyandottes..	2	1	7	..
W. Leghorns..	3	2	10	1
Blk. Minorcas..	..	..	5	2
Buff Orpingtons..	..	3	2	1

The number of eggs laid by the different breeds during the year is as follows:—

	Eggs.	Average.
12 B. P. Rocks..	980	$81\frac{2}{3}$
5 W. Wyandottes..	320	64
5 W. Leghorns..	370	74
4 Blk. Minorcas..	190	$47\frac{1}{2}$
4 Buff Orpingtons..	251	$62\frac{3}{4}$
	2,111	

BEES.

April 17. The bees were all taken out of winter quarters and placed on their summer stands at 12 o'clock, noon. The day was bright and sunny with a light north wind blowing. The hives were full of bees and they had a good fly until 5 p.m. The hives were covered with empty bags at night for a while as the temperature of the night was similar to the temperature of their winter quarters. The weights of the different colonies were as follows:—

	Nov. 18, 1905.	April 17, 1906.	Loss.
No. 1	55 lbs.	43½ lbs.	11½ lbs.
No. 2	53 "	40½ "	12½ "
No. 3	54 "	42 "	12 "
No. 4	59 "	46 "	13 "
No. 5	40 "	30 "	10 "
	261 "	202 "	59 "

Average loss per hive, 11⅘ lbs.

April 29. First pollen gathered from willows.

May 5. Bees working well. Dandelions coming in bloom.

May 17. Examined all hives and found from 4 to 5 frames of brood in each hive except No. 5, which had only 3 frames of brood, some dandelion honey stored, and young bees hatched.

June 6. No. 1 and 2 each threw off a swarm.

June 22. No. 4 threw off a swarm.

June 29. No. 5 threw off a swarm.

August 6. No. 6, prime from No. 1, threw off a swarm, seven weeks from time of hiving, making 5 swarms safely hived during the summer.

July 2. Bees began storing honey.

Following are a few of the best days gatherings for single hive.

No. 1 hive gathered July 2, 7 lbs.; July 6, 5½ lbs.; July 7, 4 lbs.

No. 2 hive, gathered July 9, 4 lbs.; July 14, 3 lbs.; July 15, 4 lbs.; July 28, 3 lbs.

No. 4 hive, gathered July 14, 3 lbs.; July 15, 4 lbs.; July 16, 4 lbs.

No. 5 hive, gathered July 18, 5 lbs.; July 19, 3 lbs.; July 21, 3 lbs.

No. 6 hive, gathered July 14, 3 lbs.; July 15, 3 lbs.; July 18, 3 lbs.; July 19, 4 lbs.; July 20, 3 lbs.; July 21, 3 lbs.; July 23, 4 lbs.; July 28, 4 lbs.

No. 7 hive, gathered July 18, 3 lbs.

No. 8 hive, gathered July 3, 3 lbs.; July 20, 3 lbs.; July 23, 3 lbs.; July 26, 4 lbs.

No. 10 hive, gathered July 3, 3 lbs.; July 18, 3 lbs.

July 10. Nos. 1, 2 and 4 colonies being full of bees, fairly well filled with brood and having top of all combs filled with honey capped, and weighing at this date 81, 52 and 49 lbs., had supers put on them. Nos. 5 and 10 had supers put on them also. The early swarms of June 22 and 26 had supers put on them on June 27. Tiering up was done on the last three mentioned colonies and also on No. 1, those colonies having at once started above, the honey coming in at a good rate.

August 11 to September 8. Very little honey was gathered between these dates. Some frames were taken out for extracting and all supers taken off. After September 8, some buckwheat and aster honey was gathered.

November 17, being a clear warm day the bees had a good fly.

November 18. The temperature on this date fell to 38° and the bees were carried into their winter quarters in the cellar of the superintendent's house, the temperature of which was 44°, the variation being from 38° to 44° during the winter. The weights of the various hives were as follows: 53, 63, 59, 50, 57, 58, 66, 50 and 64 lbs.

December 3. The wooden covers and propolis quilts were removed from eac hive and the hives covered with empty bags (three bags to each hive) and a three inc block placed in front between the bottom board and the brood chamber, making th full entrance three inches high across the full front.

At the close of the season 120 lbs. of honey were sold, being an average of 24 lbs per colony. A number of partly filled sections were kept for spring feeding, probabl about 25 lbs. At present date, March 15, all are in good condition with very fev dead bees.

APPLES.

The winter of 1906 was particularly severe and fruit and ornamental trees suffered considerably from winter-killing. The season was a poor one for fruit throughout this country. Although the apple crop at Nappan was not heavy it was nearer maximum crop than the average. The apple trees have made good growth.

The new orchard in the shelter enclosure has done remarkably well. Quite number of young trees have fruited for the first time this season.

PLUMS.

Although the plum crop was not large it was better than usual. Some of the plum trees are in an unhealthy condition, part of this may be due to unsuitable soil. Moore's Arctic, Shipper's Pride, Pond's Seedling, Gueii, Quackenboss, Reine Claude, Italian Prune, Prince's Yellow Gage, Improved Lombard, Imperial Gage and Damson, al bore fruit.

PEARS.

Twenty-nine varieties are now growing in the orchard. Most of these are making very indifferent growth and but few have borne fruit. Clapp's Favourite is the only variety which has fruited well this season.

STRAWBERRIES.

Fourteen varieties of strawberries were grown in plots 16½ x 5. These plots were planted in the spring of 1906, in 2 rows 3 feet apart and one foot apart in the rows the runners being cut off 1 foot from the outside of every second row and then allowed to fill up the space between, making a matted row 5 feet wide. One foot o space was left between every two rows. These had been covered well with abou 2 inches of clean straw in November, after the ground was nicely frozen. In the spring this straw was removed and with the exception of a part of this field where the soil was particularly poor and deficient in humus, there were very few plants killed The following is a list of some of the best yielding varieties.

STRAWBERRIES.

Variety.	Dates when picked and Yield.			Yield per Plot.	Yield per Acre.
	July 7.	July 9.	July 16.		
	Qts.	Qts.	Qts.	Qts.	Qts.
Clyde	10	11	8	29	15,312
Lovett	8	6	4	18	9,504
Warfield	4	6	4	14	7,392
Ida	6	6	2	14	7,392
Grenville	6	5	3	14	7,392
Excelsior	4	6	3½	13½	7,128
Jessie	5	6	2	13	6,864
Senator Dunlap	3	5	4	12	6,336
Beder Wood	3	5	4	12	6,336
Glen Mary	4	6	2	12	6,336
Brandywine	3	5	2	10	5,280
Williams	3	5	2	10	5,280

GARDEN PEASE.

Eight varieties of garden pease were sown in plots each 33 feet long by 2½ feet wide. The soil was clay loam of a uniform character in a fair state of fertility. The seed was sown in rows 2½ feet apart and the pease were planted 2 inches deep and 2 inches apart in the rows. The pease were picked when fit for market and the quantity of green pease in pod recorded. The yields were as follows:—

GARDEN PEASE.

Variety.	DATES OF PICKING AND YIELDS.				Total Yield from Plot.	
	July 30.		Aug. 7.			
	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.
American Wonder	7	0	9	8	16	8
Prosperity	16	0	1	8	17	8
Thomas Laxton	11	0	..	..	11	0
Nott's Excelsior	7	0	3	12	10	12
Claudit	..	..	9	0	9	0
Prince Edward	4	0	3	8	7	8
Electric Light	8	8	1	0	9	8
New Surprise	6	8	..	..	3	8

GARDEN BEANS.

Seven varieties of beans were planted on June 8 in rows 36 feet long. The seed was dropped 2 inches apart in the rows. A duplicate plot of each variety was planted and allowed to ripen.

These beans made fair growth and no rust was noticed. The following are the yields from the different plots:—

Variety.	Dates of Picking and Yields.						Total Yield from Plot.	
	August 8.		August 15.		August 22.			
	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.
Dwarf Black Speckled	8	4	3	0	2	8	13	12
Matchless	8	0	2	8	2	8	13	0
Dwarf Extra Early	10	0	4	0	3	8	17	8
Fame of Vitry	3	0	7	8	3	0	13	8
Golden Skinless	13	0	4	0	1	0	18	0
Emperor of Russia	10	8	5	0	0	8	16	0
Dwarf Wax Every Day	7	0	4	8	1	0	12	8

TOMATOES.

Twenty-four varieties of tomatoes were grown last season. The seed of the tomatoes grown this year was sown in hot-beds on April 11. The young plants were pricked out into strawberry boxes on April 25, and planted in the open ground on June 3. They were placed 4 feet apart each way and 10 plants of each variety were used. Following are the yields obtained:—

TOMATOES.

Number.	Variety.	Ripe Fruit.	Green Fruit.	Yield per Plot.
		Lbs.	Lbs.	Lbs.
1	Earliest of All	54	21	75
2	Early Ruby	52	24½	76½
3	Nott's	46½	19	65½
4	Maule's New Imperial	45	48	93
5	Rockford	42½	26	68½
6	Matchless	42½	42	84½
7	Early Minnesota	38	41	79
8	Early Hustler	37½	25	62½
9	Extra Early Atlantic Prize	36½	20	56½
10	Landreth's Earliest	35½	26	61½
11	Fordhook's First	34	39	73
12	First of All	33½	21	54½
13	Bright and Early	32	34	66
14	May's Favorite	30½	22	52½
15	Early Jewel	29	33	62
16	Radium	28½	16	44½
17	Diadem	28	31	59
18	Dominion Day	27½	23	50½
19	Simmers' Early	26	48	74
20	Early Castle	25	38	63
21	Extra Early Advance	21	26	47
22	Canada	20½	50	70½
23	New Stone	19	26	45
24	Burpee's Combination	19	42	61

LIST OF THE BEST VEGETABLES TO GROW.

REPEATED FROM REPORT OF 1905.

From several years' experience in testing many of the different varieties of vegetables now advertised by seed merchants in Canada and the United States, the following may be recommended as equal to any of those so far tested here:—

Asparagus.—Conover's Colossal and Argenteuil.

Beans.—Green Pod. Early: Bountiful and Lightning. Late: Refugee or 1,000 to 1.—Golden Pod: Market Wax and Valentine Wax.

Beets.—Extra Early: Egyptian Turnip. Early: Eclipse.

Brussels Sprouts.—Improved Dwarf.

Cabbage.—Extra Early: Paris Market. Early: Jersey Wakefield. Medium: Early Spring and Succession. Late: Late Flat Dutch. Red: Mammoth Rock Red.

Carrots.—Chantenay.

Cauliflower.—Early Erfurt.

Celery.—Paris Golden Yellow Self-blanching, Improved White Plume and Perfection Heartswell.

Corn.—Extra Early: Extra Early Beverly. Early: Extra Early Cory and Premo. Medium: Crosby's Early.

Cucumbers.—White Spine.

Egg Plant.—New York Improved Purple.

Kale.—Dwarf Green Curled.

Lettuce.—Curled: Black Seeded Simpson. Cabbage: Improved Salamander.

Citron Melon.—Colorado Mammoth.

Water Melon.—Cole's Early.

Onions.—Prizetaker and Australian Brown.

Parsley.—Double Curled.

Parsnips.—Hollow Crown and Improved Half Long.

Pease, Tall.—Extra early: Surprise. Early: Thomas Laxton. Medium: Admiral Dewey. Late: Telephone. *Dwarf.*—Extra Early: Early Excelsior. Early: Nott's Excelsior. Medium: Rivenhall Wonder. Late: Juno.

Radishes.—French Breakfast and Icicle. Winter: Scarlet China.

Rhubarb.—Linnæus and Victoria.

Salsify.—Sandwich Island.

Spinach.—Victoria.

Squash.—Autumn: Boston Marrow and Golden Hubbard. Late: Hubbard.

Tomatoes.—Spark's Earliana.

Turnips.—Golden Ball and Selected Purple Top Swede.

CORRESPONDENCE.

During the year 2,675 letters were received at this farm and 2,715 sent out, exclusive of reports and of circulars mailed with samples of grain.

AGRICULTURAL MEETINGS.

During the year I attended and delivered addresses at the following meetings:—Winter Fair, Amherst, N.S., December 4 to 7, 1905. N. B. Farmers' and Dairymen's Associations at Fredericton, Jan. 22 to 26. Short Course Judging, Truro, N.S., February 1 to 10. Waweig, N.B., February 26 to 29. Provincial Dairy School. Sussex, N.B., March 6 to 10; March 16 to 20. Blue Mountain, Pictou county, March 28. Garden of Eden, Pictou county, March 29. Lorneville, Cumb. county, N.S., April 2. Northport, Cumb. county, April 3. Shinimicas, Cumb. county, N.S., April 4. Halifax, N.S., April 9 to 11. Winter Fair, Amherst, N.S., December 3 to 6. Short Course Judging, Truro, N.S., January 21 to 26, 1907. N. S. Farmers' and Dairymens' Association, Middleton, N.S., January 28 to 31. N. B. Farmer's and Dairymen's Association, Fredericton, N.B., February 11 to 15. Prov. Dairy School, Sussex, N.B., March 4 to 14.

EXHIBITIONS.

Together with all the Experimental Farms of the Dominion, an exhibit of the products of this farm was made at the Dominion Exhibition in Halifax, N.S., September 22 to October 5. An exhibit was also made at Charlottetown, P.E.I., October 8 to 12.

VISITORS.

About the usual numbers visited the farm the past year, mostly in small companies of from twenty to forty in a party; the largest gathering being the Maritime Board of Trade, which having met in Amherst, spent an afternoon at the Experimental Farm, a company of about one hundred.

I have the honour to be, sir,

Your obedient servant,

R. ROBERTSON,

Superintendent.

EXPERIMENTAL FARM FOR MANITOBA.

REPORT OF N. WOLVERTON, B.A., SUPERINTENDENT.

BRANDON, MAN., March 31, 1907.

To DR. WM. SAUNDERS, C.M.G.,
Director, Dominion Experimental Farms,
Ottawa.

SIR,—I have the honour to submit, herewith, the nineteenth annual report and details of the work done on the Experimental Farm at Brandon.

The spring and early summer of 1906 were very favourable for seeding and growth. Excepting on the bottom lands, the seeding was finished early and in good condition. Some of the heavy low land was too wet for early working.

There was no late spring frost to injure, and growth was very rapid. The promise of a very heavy crop was bright until the wheat was in the early milk state, when rust appeared pretty generally. Though the rust was almost wholly confined to the leaves of the grain, it certainly reduced the yield somewhat.

When the wheat was maturing we had some days of excessive heat, with dry south wind, causing the grain to ripen too rapidly. These two causes reduced the yield of all grains by several bushels per acre.

Harvest began August 15. The weather was good both for harvesting and threshing and all grains in the province were secured in excellent condition.

The average number of days maturing was less by nearly ten than usual.

The yields for the whole province fell short of the large crop of 1905 by about 15 per centum.

The first slight frost occurred on the morning of August 30, when the mercury fell to 29·3 degrees, but little damage was done. There was no frost on the uplands. The second, a killing frost, occurred September 27, when 26·5 degrees were registered.

EXPERIMENTS WITH SPRING WHEAT.

The wheat was well sown and the ground in good condition. Germination was good and even.

A peculiarity of most kinds of wheat, this year, was that from two to four of the lowest spikelets on each head were abortive.

Again the Preston wheat heads the list in yield. Its stiff straw is a decided advantage. This year the bearded wheats have all taken higher places than usual. Possibly they were able to resist the effects of the hot wind better than the bald wheats.

There was no smut excepting in the smut test plots. The seed was dipped in a formalin solution.

A number of the less promising varieties have been dropped from this test this year. Out of the thirty varieties under test during the past few years sixteen have been retained for further testing.

Each plot was one-twentieth of an acre; the seed was sown April 23 and 24, on light clay loam summer fallowed.

SPRING WHEAT—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw including Head.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.		Weight per measured Bushel after cleaning.	Rusted.
				In.		In.		Lbs.	Bush.	Lbs.	Lbs.	
1	Preston	Aug. 15	113	45	Stiff	3½	Bearded ..	4,060	44	00	63¼	Considerably.
2	Huron	" 16	114	46	Weak ..	3	" ..	4,570	43	50	62	Slightly.
3	Pringle's Champlain.........	" 15	113	44	" ..	3¼	" ..	4,390	41	50	62¾	Considerably.
4	Red Fife.........	" 17	115	43	Medium	3½	Bald	5,300	40	00	63	"
5	White Fife......	" 18	116	43	Stiff....	3½	"	4,320	36	20	63	Badly.
6	Haynes' Blue Stem.........	" 20	118	47	Weak ..	4	"	4,740	36	00	61	Considerably.
7	Hungarian White	" 14	112	44	" ..	3¼	"	3,790	35	10	62	"
8	Stanley	" 13	111	45	Stiff....	3	"	3,790	35	10	61	Badly.
9	Bishop..........	" 10	108	44	Medium	3½	"	4,100	35	00	63	Considerably.
10	Riga............	" 9	108	43	" .	3¼	"	4,610	34	50	62½	"
11	Percy...........	" 13	111	46	Stiff....	3	"	3,910	34	50	62½	Badly.
12	Herisson Bearded	" 15	113	46	Weak ..	2	Bearded ..	3,630	34	30	63½	Considerably.
13	Colorado	" 14	112	47	" ..	3¼	" ...	6,040	34	20	63½	"
14	Red Fern	" 16	115	46	" ..	3½	" ...	4,380	32	00	63	"
15	White Russian ..	" 13	112	46	Medium	4	Bald	4,820	31	20	61½	Badly.
16	Laurel	" 17	116	44	Weak ..	3¾	"	4,460	25	40	59	"

EXPERIMENTS WITH MACARONI WHEAT.

These wheats, being weak in the straw, were badly lodged. There was no rust and the yields were larger; yet, as there is, here, no market for them they are not recommended. If grown for feed there would be serious danger of mixing the seed. A few grains of these Durum wheats will reduce the grade of Red Fife.

Each plot was one-twentieth of an acre and the seed was sown April 24 on light clay loam, summer fallowed.

DURUM WHEAT—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw including Head.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.		Weight per measured Bushel after cleaning.	Rusted.
				In.		In.		Lbs.	Bush.	Lbs.	Lbs.	
1	Goose..........	Aug. 16	114	49	Weak ..	2¾	Bearded ..	4,120	56	20	65½	None.
2	Yellow Gharnovka..........	" 16	114	46	" ..	2½	" ..	4,000	55	00	65	"
3	Roumanian	" 16	114	48	" ..	2½	" ..	4,040	54	20	66½	"
4	Mahmondi	" 16	114	43	" ..	2¼	" ..	3,220	46	20	64	"

Residence of Superintendent, Experimental Farm, Brandon, Man.

EXPERIMENTS WITH EMMER AND SPELT.

Each plot was one-twentieth of an acre. The seed was sown April 24 on light clay loam, summer fallowed.

EMMER AND SPELT—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw including Head.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Grain per Acre.	Rusted.
				In.		In.		Lbs.	Lbs.	
1	Common Emmer.....	Aug. 16	114	41	Weak ..	2	Bearded ..	3,780	3,820	Slightly.
2	Red Spelt...........	" 20	118	44	Stiff	4¼	" ..	3,220	3,180	Considerably.
3	Red Emmer	" 20	118	42	Weak ..	2½	" ..	4,200	3,000	"
4	White Spelt	" 20	118	43	Medium	4½	" ..	3,260	2,740	"

A TEST OF FERTILIZERS FOR THE GROWING OF WHEAT.

Red Fife wheat was sown May 7, on uniform plots of light loam, and harvested August 20. Each plot was one-fortieth of an acre. All were sown on summer-fallow which has been under cultivation for many years without manure, On all plots the grain stood up well and there was no smut and but little rust.

The cost of these commercial fertilizers, at retail prices in Brandon, owing to high freights, is large. In no case has the value of the increase in the yield been equal to the cost of the fertilizers used. It must, however, be noted that the land of these plots is of good quality and was summer-fallowed.

WHEAT.—TEST OF FERTILIZERS.

Number.	Fertilizer Used per acre.	Length of Straw.	Length of Head.	Straw per Acre.	Grain per Acre.		Weight per Bushel.
		Inches.	Inches.	Lbs.	Bush.	Lbs.	Lbs.
1	100 lbs. per acre of nitrate of soda, half sprinkled when the grain was 2 in. high, balance when 6 in. high..........	42	3½	3,400	33	20	60½
2	200 lbs. per acre of nitrate of soda, half sprinkled when the grain was 2 in. high, balance when 6 in. high..................	42	3½	3,640	32	40	60½
3	No fertilizer used.........................	42	3½	4,040	32	40	60½
4	Superphosphate, 400 lbs. per acre, spread just before sowing....	42	3½	4,160	37	20	60½
5	Muriate of potash, 200 lbs. per acre, spread just before sowing.	42	3½	4,440	39	20	60½
6	A mixture of 200 lbs. superphosphate, 100 lbs. of nitrate of soda, 100 lbs. muriate of potash, per acre, half spread before sowing, half when 2 or 3 inches high.......	42	3½	3,820	37	40	60½

Field Plots of Wheat.

Variety.	Size of Field.	Yield per Acr	
	Acres.	Bush.	L
Preston	6	35	2
Red Fife	19	34	2
Huron	3·25	33	1
Pringle's Champlain	5	31	2
White Fife	5·72	21	.

Different preparation for a wheat crop. All on plots one-twentieth of an ac

Preparation.	Rusted.	Sown.	Ripe.	Weight of Straw.	Yiel per Acre	
				Lbs.	Bush.	L
Wheat after barley	None	May 10	Aug. 23	3,200	30	.
" peas	"	" 10	" 23	3,600	30	.
" oats	"	" 10	" 23	3,820	31	2
" wheat	"	" 10	" 23	3,620	29	4
Wheat on summer-fallow	Slightly	" 10	" 23	4,120	29	4
" after millet	None	" 10	" 23	3,620	33	.

PREVENTIVES OF SMUT.

The seed sown on these plots was very smutty, such as no farmer should u hence the test was a very severe one.

The formalin was fresh and of the usual strength.

The bluestone had been held over from two to four years and exposed to the for that length of time. It was used in order that the effect of long keeping might seen. The table shows that this old bluestone was not as effective as the fresh h been in former tests.

Yet, the fact that the plots, where formalin was used, were not entirely free fr smut, would show that *very smutty seed should not be used even when treated wi great care.*

Seed should be handled with great care after being treated. If the seed is plac on a floor where smutty wheat has been, or if infected grain is moved in the barn cau ing the smut spores to float in the air, or if the treated seed be put into bags whi have held smutty grain, it may become infected again.

It seems to be uncertain how long smut spores will retain vitality in the groun It is well to treat the seed with formalin or bluestone every spring, whether smut h been present or not. A farm may have been free for years and smut appear quantity without the source being known.

PREVENTIVES OF SMUT IN WHEAT.

How Treated.	Good Heads in 9 sq. ft.	Smutty Heads in 9 sq. ft.	Yield per Acre.	
			Bush.	Lbs.
Smutty wheat sprinkled with 9 oz. formalin to 10 galls. of water.	497	1	34	..
" steeped 5 min. in 4½ oz. formalin to 10 galls. of water	486	2	33	40
" sprinkled with 1 lb. bluestone to 1 pail of water....	491	8	31	40
" steeped 5 min. in ½ lb. bluestone to 1 pail of water..	479	15	31	10
" not treated......	321	128	19	30

ROTATION OF CROPS.

In the spring of 1899 arrangements were made for a series of rotation plots, the principal object being the maintenance of the fertility of the soil by the ploughing under of a leguminous crop every third year instead of the usual summer-fallow.

As the first field selected for this purpose was flooded in 1902 and 1904, it was considered unsuitable, and a new location was selected last year.

The Red Clover was sown at the rate of 12 lbs. per acre and mixed clovers in the proportion of 8 of Alfalfa and 6 lbs. of Alsike per acre. These leguminous plants were ploughed under when they reachd their fullest development.

The grains used in this test were Red Fife wheat, Banner oats, Mensury barley and Gregory pease. The size of the plots was one-twentieth of an acre.

ROTATION TEST.

The order of rotation is as follows:—

Number.	1905.	1906.	1907.
1..	Pease	Wheat	Wheat.
2.............	Tares......................	Wheat	Oats.
3.....	Red Clover..................	Wheat	Wheat.
4.............	Alfalfa and Alsike..........	Wheat	Barley.
5.............	Wheat	Wheat	Pease.
6.......	Wheat	Oats...................... .	Tares.
7.......	Wheat	Wheat	Red Clover.
8.......	Wheat ...., ...	Barley.......	Alfalfa and Alsike.
9......	Wheat	Pease......................	Wheat.
10............	Oats.........	Tares.....................	Wheat.
11....	Wheat	Red Clover	Wheat.
12............	Barley.......	Alfalfa and Alsike	Wheat.
13..	Wheat	Wheat	Summer-fallow.
14.......	Wheat	Oats..	Summer-fallow.
15........ ...	Wheat	Barley......................	Summer-fallow.
16............	Wheat	Wheat	Oats.
17....	Wheat	Barley......................	Oats.

RESULTS OF FIRST TWO YEARS, 1905-1906.

Number.	Crop.		Yield per Acre.			
	1905.	1906.	1905.		1906.	
			Bush.	Lbs.	Bush.	Lbs.
1	Pease	Wheat			33	30
2	Tares	"			33	30
3	Red Clover	"			30	40
4	Alfalfa and Alsike	"			30	10
5	Wheat	"	35	50	30	10
6	"	Oats	36	20	102	22
7	"	Wheat	35	00	27	50
8	"	Barley	33	00	52	04
9	"	Pease	33	30		
10	Oats	Tares	105	00		
11	Wheat	Red Clover	35	20		
12	Barley	Alfalfa and Alsike	40	10		
13	Wheat	Wheat	35	40	28	50
14	"	Oats	35	10	85	00
15	"	Barley	38	10	46	22
16	"	Wheat	35	10	28	40
17	"	Barley	35	50	46	12

EXPERIMENTS WITH OATS.

Forty varieties of oats were tested on uniform plots of one-twentieth of an acre each. The land was a rather heavy clay loam, summer-fallowed. The weaker kinds were lodged badly; there was considerable rust on most of the leaves; and no smut.

The yield was good and the quality excellent. Both last year and this the Daubeney ripened fourteen days earlier than the Banner. Our seed of this oat is not pure. A few heads of a later and taller oat showed. These were hand pulled from the test plot but, from lack of time, were not pulled from the field plot.

All the seed was treated with formalin, and was sown May 9 and 10.

Oats—Test of Varieties.

Number.	Name of Variety.	Date of Ripening.		No. of Days Maturing.	Length of straw including Head.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.		Weight per measured Bushel after cleaning.	Rusted.
					In.		In.		Lbs.	Bush.	Lbs.	Lbs.	
1	American Beauty...	Aug.	18	100	52	Weak	10	Branching	5,140	116	16	36¼	Consid'ably.
2	Banner..........	"	21	104	57	Medium..	9½	"	4,520	114	4	37½	"
3	Improved American.	"	16	99	54	" ..	9	"	5,340	110	20	37½	Slightly.
4	Mennonite..........	"	15	97	46	" ..	8	"	4,840	110	20	34½	Consid'ably.
5	Tartar King.......	"	15	98	54	Stiff......	8	Sided	5,360	110	..	38	Slightly.
6	White Giant........	"	18	101	52	Medium..	8	Branching	4,960	110	..	39	Consid'ably.
7	Columbus..........	"	20	102	49	Weak	8½	"	4,460	107	2	36½	"
8	Thousand Dollar....	"	20	102	52	"	8	"	5,210	105	20	40½	"
9	Danish Island......	"	20	103	51	Medium..	8½	"	4,420	105	10	39½	"
10	Improved Ligowo...	"	23	106	56	Weak	10	"	5,320	105	10	39¼	Slightly.
11	Bavarian...........	"	20	102	52	Medium..	9	"	4,750	104	14	38	"
12	Sensation.	"	15	98	48	" ..	8	"	4,590	103	8	38½	"
13	Twentieth Century..	"	22	104	49	Weak	9	"	5,400	102	32	36	Consid'ably.
14	Kendal White......	"	21	103	50	"	8	"	3,680	100	20	40	"
15	American Triumph..	"	22	104	48	"	9	"	4,200	100	..	38	"
16	Siberian............	"	18	101	52	"	10	"	5,310	99	24	36	"
17	Buckbee's Illinois...	"	20	103	49	"	9	"	4,310	99	24	38	Slightly.
18	Storm King........	"	16	98	54	Stiff....	8½	Sided	5,620	99	14	37	Consid'ably.
19	Golden Giant.......	"	25	107	52	Weak ..	9	"	5,520	99	14	34½	"
20	Golden Fleece ...	"	16	99	50	Medium..	8	Branching	4,540	98	28	35	"
21	Lincoln............	"	16	99	53	Weak ...	8	"	4,570	97	32	41	"
22	Wide Awake.......	"	20	102	54	"	8½	"	4,680	97.	22	37½	"
23	Goldfinder...... ...	"	18	100	49	Medium..	8½	"	5,000	97	2	32	Slightly.
24	Golden Beauty	"	20	102	48	Weak	9	"	4,220	96	16	37	"
25	Holstein Prolific .	"	20	102	50	"	9½	"	5,530	96	6	35	Consid'ably.
26	Abundance.........	"	22	105	55	" ...	9	"	4,630	96	6	39	"
27	Waverley...........	"	18	101	56	Medium..	8½	"	4,700	94	4	40	Slightly.
28	Black Beauty. ...	"	16	98	50	Weak	10	"	4,850	92	22	34½	Consid'ably.
29	Olive Black.........	"	21	103	56	Medium..	9½	Sided .. .	4,660	92	12	38	"
30	Irish Victor... . ..	"	21	103	54	Weak	7½	Branching	4,580	91	26	39½	"
31	Virginia White.. ..	"	19	101	50	" ...	8	"	3,410	87	32	41¼	Slightly.
32	Pioneer........ ..	"	15	97	48	Stiff......	9	"	4,420	87	22	39⅓	"
33	Joanette...........	"	16	98	43	Weak	7½	"	4,890	85	20	32½	"
34	Kendal Black..... .	"	20	102	55	Medium..	9	Sided	5,900	82	12	32	Consid'ably.
35	Milford Black......	"	20	102	53	" ..	9	"	3,690	79	24	39	"
36	Swedish Select......	"	16	99	53	" ..	8	Branching	5,220	72	32	41	"
37	Milford White	"	22	105	54	Weak	8½	Sided.....	6,790	70	30	35½	Slightly.
38	Scottish Chief.	"	21	103	50	"	7	Branching	6,300	70	20	37½	"
39	Swedish Milling....	"	21	103	50	"	7½	"	5,720	70	..	38	"
40	*Daubeney..........	"	8	90	41	Stiff......	6½	"	2,540	69	14	35	"

* It is estimated that blackbirds took 20 bush. per acre from the Daubeney.

Different Preparations for an Oat Crop.

(1-20th Acre plots.)

Preparation.	Rusted.	Sown.	Ripe.	Weight of Straw.	Yield per Acre.	
				Lbs.	Bush.	Lbs.
Oats after wheat.	None.......	May 10.....	Aug. 16....	3,980	112	12
" " oats..............................	"	" 10....	" [illegible]....	4,040	113	18
" " peas	"	" 10. ...	" 16 ...	4,620	120	..
" " barley..............................	"	" 10.....	" 16...	3,740	101	26
" " millet..............................	"	" 10.....	" 17....	4,260	115	30
" on summer-fallow..................	Slightly	" 10.....	" 18....	4,210	108	18

EXPERIMENTS WITH BARLEY.

Since wild oats have spread so much throughout this province, there is an active demand for an early variety of barley that will ripen before the wild oats shell, and by this means assist in eradicating the weed.

The earlier ripening six-rowed varieties are the best for this purpose. The Champion a beardless variety, is the earliest of all, but this is less productive and inferior in quality.

When barley is used for this purpose it should be cut before maturity, otherwise some of the wild oats will have shelled.

Eighteen varieties of six-rowed and fourteen varieties of two-rowed barley were tested. The falling off from the unusually heavy crop of last year was in about the same ratio as other grains. Mensury, both in the test plot and in the field plot, stood up fairly well, probably better than any other, though it was very flat on the lower land. The Odessa was entirely down. For some unknown reason Mansfield came far down in the list this year.

Each plot was one-twentieth of an acre. The seed was sown May 28, on sandy loam, summer-fallowed.

SIX-ROWED BARLEY—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of straw, including head	Character of Straw.	Length of Head.	Weight of Straw.	Yield per Acre.		Weight per measured bushel after cleaning.	Rusted.
				In.		In.	Lbs.	Bush.	Lbs.	Lbs.	
1	Blue Long Head....	Aug. 24....	88	38	Weak ...	3½	2,990	66	42	45	Considerably.
2	Nugent...........	〃 21....	85	38	〃	3	5,040	65	40	50	〃
3	Mensury..	〃 19....	83	40	Medium..	3½	3,060	61	12	52	Slightly.
4	Odessa.............	〃 19....	83	38	Weak	3	4,180	60	40	51½	Considerably.
5	Yale.........	〃 17....	81	41	Medium..	2¾	3,710	60	10	52	〃
6	Claude......... ...	〃 22....	86	41	Weak	2¾	3,740	57	24	49	Slightly.
7	Empire............	〃 17....	81	38	〃	3	2,790	56	22	51	Considerably.
8	Albert...	〃 16....	80	39	Medium..	2¾	2,420	55	40	53	〃
9	Trooper...........	〃 21....	85	39	Weak	2½	3,550	55	10	51¼	〃
10	Champion	〃 14....	78	40	Medium..	2½	4,110	53	46	45	〃
11	Argyle............	〃 20 ...	84	40	Weak	3	4,630	51	22	50	〃
12	Royal	〃 20....	84	39	〃 ...	3	3,480	50	20	50	Slightly.
13	Summit.......... ..	〃 22....	86	41	〃	3	3,590	50	10	51	Considerably.
14	Common.	〃 18....	82	35	〃	3	2,540	49	8	51¼	〃
15	Stella	〃 21....	85	38	〃	3	4,850	48	46	50½	Slightly.
16	Oderbruch..........	〃 17....	81	36	〃	3	2,500	47	44	52½	Considerably.
17	Mansfield.	〃 19....	83	38	Medium..	3¼	2,800	47	44	52	Slightly.
18	Brome......	〃 21....	85	39	Weak....	3	1,460	44	28	52½	Considerably.

TWO-ROWED BARLEY—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of straw, including head	Character of Straw.	Length of Head.	Weight of Straw.	Yield per Acre.		Weight per measured bushel after cleaning.	Rusted.
				In.		In.	Lbs.	Bush.	Lbs.	Lbs.	
1	Jarvis	Aug. 20	84	43	Medium	4½	4,410	66	22	53	Slightly.
2	French Chevalier	" 25	89	42	Weak	4	5,170	61	02	51½	Considerably.
3	Clifford	" 20	84	45	Medium	4	3,490	60	30	51	Slightly.
4	Gordon	" 20	84	43	Weak	3	4,750	59	18	49½	Considerably.
5	Swedish Chevalier	" 25	89	40	"	4½	4,020	55	40	49½	"
6	Harvey	" 19	83	44	"	4	4,930	53	26	50	"
7	Danish Chevalier	" 25	89	38	"	4	3,810	51	42	48	"
8	Canadian Thorpe	" 21	85	41	Medium	3	4,450	51	02	51	Slightly.
9	Invincible	" 24	88	40	Weak	3	2,490	50	10	51½	Considerably.
10	Sidney	" 18	82	40	"	4	5,210	49	38	51½	"
11	Dunham	" 20	84	41	"	3	4,310	49	38	50½	"
12	Beaver	" 22	86	41	"	4	4,270	48	26	50	Slightly.
13	Logan	" 20	84	45	"	4	5,610	47	34	50½	Considerably.
14	Standwell	" 25	89	43	"	3	3,930	47	14	47	"

DIFFERENT PREPARATIONS FOR A BARLEY CROP.

(1-20th Acre Plots.)

Preparation.	Rusted.	Sown.	Ripe.	Weight of Straw.	Yield per Acre.	
				Lbs.	Bush.	Lbs
Barley after millet	None	May 25	Aug. 15	2,840	70	..
" " wheat	"	" 25	" 15	2,700	66	32
" " oats	"	" 25	" 15	2,960	63	16
" " pease	"	" 25	" 15	2,120	66	12
" " barley	"	" 25	" 15	2,740	65	40
" on summer-fallow	Slightly	" 25	" 15	3,820	64	08

EXPERIMENTS WITH PEASE.

Twenty-four varieties of field pease were tested on light clay loam, in plots of one-twentieth of an acre each. From two to three bushels of seed was sown to the acre, according to the size of the pease.

There were no signs of cutworms, or other insect pests, and the yield was much above the average.

All were sown April 30, with the double disc drill, and germination was rapid and even.

The test plots were cut with the scythe and threshed with the flail. The harvester attachment for the mower did not work well, so the field plots were cut with the mower, a man following to roll the cut vines out of the way. They were threshed with the ordinary separator.

PEASE—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.		Number of Days Maturing.	Character of Growth.	Length of Straw.	Length of Pod.	Size of Pea.	Yield per Acre.		Weight per Bushel.
						Inches.	Inches.		Bush.	Lbs.	Lbs.
1	Black Eyed Marrowfat.	Sept.	3	126	Strong ...	65	2½	Large ...	58	20	61¼
2	Prince	Aug.	29	121	"	64	2¼	"	53	40	64
3	Duke	"	30	122	"	54	2½	"	53	20	64½
4	Gregory.....	"	30	122	"	59	2½	Medium..	53	..	64½
5	White Wonder........	Sept.	1	124	Medium..	48	2¼	" .	51	40	64
6	Chancellor	Aug.	28	120	" ..	40	2	Small	51	40	65
7	White Marrowfat.....	Sept.	3	126	Strong ...	65	2½	Large	51	20	63
8	Prussian Blue	Aug.	27	119	"	70	2¼	Medium..	51	..	65
9	Mackay.............	Sept.	3	126	"	60	2¾	" ..	50	..	64
10	Nelson...............	Aug.	31	123	Medium..	46	2½	" ..	50	..	64
11	Paragon..............	Sept.	5	128	Strong ...	56	2½	.. ..	50	..	64
12	Arthur...............	Aug.	25	117	Medium..	48	2½	Medium..	48	20	64½
13	Early Britain....	Sept.	7	130	Strong ...	56	2½	" ..	48	20	61½
14	Victoria......	"	3	126	"	54	2¼	" ..	46	40	64
15	Wisconsin Blue...... .	Aug.	29	121	"	56	2¼	" ..	46	20	65
16	Pearl................	Sept.	10	133	"	60	2¾	Large	45	10	63¾
17	Golden Vine	Aug.	31	123	"	54	2¼	Small.....	44	50	65
18	Archer...............	Sept.	6	129	" ...	60	2¼	Medium..	44	30	64
19	Daniel O'Rourke	"	3	126	"	52	2¼	Small.....	44	20	65
20	Picton	"	7	130	" ...	56	2½	Large	43	40	64½
21	Prince Albert	"	4	127	" ...	62	2¼	Small	41	40	64
22	Agnes......	"	7	130	Medium..	50	2¾	Large	40	..	61
23	Kent.................	"	4	127	Strong ...	60	2¾	"	39	..	62
24	English Grey	"	7	130	"	60	2¼	Medium..	38	..	63

EXPERIMENTS WITH FLAX.

All our experimental plots of flax were destroyed. Immediately after sowing a heavy rain covered all the plots with water and washed and floated the seed. All the plots were so badly mixed that they were of no value as experiments, nor was the seed harvested fit for sowing again.

SEED GRAIN.

The following are samples of many letters received from those who have purchased seed grain from this farm:—

TREHERNE, MAN., December 18, 1906.

The Supt. Experimental Farm,
Brandon, Man.

SIR,—I bought from your farm, five bushels of Red Fife wheat last winter. It was sown April 21, one and one-half bushels to the acre; cut August 24, and yielded 48 bushels to the acre.

ANTONE CHABBERT.

RESTON, MAN., September 24, 1906.

The Supt. Experimental Farm,
Brandon, Man.

DEAR SIR,—I got 9 bushels of Red Fife wheat at the farm last spring. I sowed it on six acres of summer-fallow on April 10. It was cut on August 10, threshed on September 28, and yielded 33 bushels to the acre.

DAVID PATTERSON.

RAPID CITY, MAN., October 29, 1906.

N. WOLVERTON,
Supt. Experimental Farm,
Brandon, Man.

DEAR SIR,—We received from your farm last winter, 5 bushels of Red Fife wheat. We sowed this wheat on new land on April 16, the seeder registered not quite 3 acres. It was cut on August 15, and threshed on September 5 from the stook, and yielded 180 bushels of No. 1 hard wheat.

W. R. HEAD.

EXPERIMENTS WITH INDIAN CORN.

Indian corn is grown here for fodder only. The only variety which ripens its grain here is the Squaw Corn. Though the ears of most varieties will not ripen, yet the heavy yield of stalks and leaves gives a large amount of most excellent fodder, averaging over 16 tons of green feed per acre.

The corn stalks are fed partly as ensilage and partly dry. In the latter case they are brought from the field and cut as needed.

The silo was built long ago and is square. That form is wasteful as the material does not settle as well as in the round silo, and much is spoiled in the corners. It extends from two feet below the stable floor to a height of 11 ft. 6 inches above the next floor, and is inside against the west end of the barn. Sometimes a few inches of ensilage, on the west side is frozen. Dimensions, 24 feet by 8½ feet x 9 feet inside, and holds 30 tons of green cut corn stalks. We have two such silos. Ensilage was not fed to milking cows as we feared it might taint the milk.

The corn crop was slightly above the average in weight and the ears were in the early milk stage when cut.

The corn was sown on June 11, in rows 30 inches apart. The crop was cut August 27. Soil a sandy loam, summer-fallowed. Twenty-three varieties were sown and the yield per acre in each case was calculated from two rows, each 66 feet long.

INDIAN CORN—TEST OF VARIETIES.

Number.	Name of Variety.	Height.	Leafiness.	When Tasselled.	In Silk.	Condition when Cut.	Weight per Acre grown in rows.		Weight per Acre grown in hills.	
		Inches.					Tons.	Lbs.	Tons.	Lbs.
1	Thoroughbred White Flint	93	Leafy	Aug. 16	Aug. 24	Silk	21	1,296	23	464
2	Champion White Pearl....	105	Fairly leafy.	" 16	" 22	" ...	21	1,560	20	392
3	Longfellow	98	"	" 8	" 20	" ...	21	768	19	1,336
4	Superior Fodder..........	89	"	" 16	....	Tassel..	19	1,600	20	1,712
5	Chad's Early Yellow.....	102	"	" 20	....	" ...	19	1,072	20	656
6	Compton's Early	89	Very leafy..	" 10	Aug. 18	Silk	19	808	17	1,640
7	Early Butler.........	102	Fairly leafy.	" 12	" 20	" ...	19	544	20	1,184
8	Angel of Midnight	82	Very leafy..	" 8	" 21	" ...	19	280	16	1,792
9	North Dakota White......	86	"	" 12	" 25	" ...	19	16	20	392
10	Eureka..	96	Fairly leafy.	" 27	....	Tassel..	18	960	18	1,488
11	King Philip......... . .	91	Very leafy..	" 11	Aug. 20	Silk	18	696	18	1,752
12	Red Cob Ensilage........	90	Fairly leafy.	" 25	... .	Tassel..	18	432	20	1,184
13	Salzer's All Gold.........	91	"	" 15	Aug. 22	Silk ...	18	960	16	1,528
14	Early Mastodon	98	"	" 22	......	Tassel..	18	168	16	1,080
15	Early Longfellow.........	84	Very leafy..	" 6	Aug. 15	Silk....	18	168	15	360
16	Pride of the North.......	88	"	" 22	....	Tassel..	17	848	18	1,488
17	Giant Prolific Ensilage	86	Fairly leafy.	" 15	Aug. 22	Silk	16	1,096	16	1,528
18	Early Leaming............	93	"	" 8	" 21	" ...	16	472	15	1,944
19	Northern Dent............	87	"	" 16	" 26	" ...	15	624	15	452
20	Mammoth Cuban	99	"	" 15	" 22	" ...	15	624	14	776
21	Selected Leaming........	100	"	" 11	" 21	" ...	14	1304	15	96
22	Evergreen Sugar........	74	"	" 21	......	Tassel..	14	248	15	360
23	White Cap Yellow Dent ..	102	"	" 9	Aug. 20	Silk	13	1984	16	472

INDIAN CORN SOWN AT DIFFERENT DISTANCES APART.

No.	Name of Variety.	Distance Apart.	Height.	Condition when cut.	Weight per acre, cut green.	
		Inches.	Inches.		Tons.	lbs.
1	Longfellow	24	90	In silk.	25	1,810
2	"	30	90	" "	26	1,592
3	"	36	90	" "	24	1,500
4	"	42	90	" "	25	1,857
1	Selected Leaming	24	96	" "	26	1,460
2	" "	30	96	" "	27	1,176
3	" "	36	96	" "	23	640
4	" "	42	96	" "	26	800
1	Champion White Pearl	24	93	" "	27	1,440
2	" " "	30	93	" "	31	40
3	" " "	36	93	" "	29	300
4	" " "	42	93	" "	25	1,291

It will be noticed that fodder corn planted in rows 30 inches apart and cultivated gives the heaviest yield.

EXPERIMENTS WITH FIELD ROOTS.

This year all kinds of field roots fell below the average in yield, but the quality was excellent.

Two sowings, about two weeks apart, were made, but neither was touched with frost. The yield from the earlier sowing was the better. This seems to have always been the case here.

TURNIPS.

Twenty varieties of turnips were sown on sandy loam, treated with well rotted barnyard manure. Two sowings were made. There was no damage by frost or insects. The yield was below the average of past years.

The average yield, per acre, of Hartley's Bronze for five years has been 31 tons 787 lbs., or 1,046 bushels 27 lbs.

The first plots were sown May 22 and pulled October 11; the second plots were sown June 8 and pulled October 11. The yield from the earlier sowing was much the larger. The estimate of yield per acre was made from two rows, each 66 feet long.

TURNIPS—TEST OF VARIETIES.

Number.	Name of Variety	Yield per acre.							
		1st Plot.				2nd Plot.			
		Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
1	Hartley's Bronze	26	1,856	897	36	20	1,184	686	24
2	Sutton's Champion	26	1,592	893	12	19	1,072	651	12
3	Hall's Westbury	25	1,744	862	24	17	1,904	598	24
4	Good Luck	25	952	849	12	19	808	646	48
5	Bangholm Selected	25	424	840	24	15	1,944	532	24
6	Jumbo	24	576	809	36	19	1,600	660	..
7	Carter's Elephant	24	48	800	48	16	736	545	36
8	Magnum Bonum	23	1,784	796	24	18	1,224	620	24
9	Imperial Swede	22	880	748	..	19	808	646	48
10	Emperor Swede	22	88	734	48	16	1,264	554	24
11	Mammoth Clyde	21	1,560	726	..	16	208	536	48
12	Kangaroo	21	1,032	717	12	16	1,792	563	12
13	Perfection Swede	20	1,976	699	36	18	1,752	629	12
14	Elephant's Master	20	1,448	690	48	16	472	541	12
15	Selected Purple Top	20	1,184	686	24	19	280	638	..
16	East Lothian	20	392	673	12	13	1,984	466	24
17	Halewood's Bronze Top	19	544	642	24	17	1,376	589	36
18	New Century	19	16	633	36	19	1,336	655	36
19	Drummond Purple Top	18	1,488	624	48	13	664	444	24
20	Skirvings	18	696	611	36	18	168	602	48

EXPERIMENTS WITH MANGELS.

Mangels are relished by nearly all kinds of farm animals; cattle, swine and even chickens, eat them readily. Unlike turnips, they do not injure the quality of milk and its products.

As mangel seed is large and somewhat slow to germinate, the soil should be mellow and moist, and the seed sown from two to three inches deep.

The roots are susceptible to injury from fall frosts, for which reason the crop should be pulled before the weather becomes severe.

Sixteen varieties of mangels have been on trial at the Experimental Farm this year. The yield was above the average and all were saved without injury.

The soil used for this crop was a black loam fertilized in the fall of 1905, with ten loads per acre of well rotted manure. The first sowing was made on May 23, and the second on June 7. All were pulled on October 8.

The estimate of yield per acre has been made from the product of two rows 66 feet long.

The average yield of Prize Winner Yellow Globe, for five years has been 26 tons, 1,120 lbs., or 385 bushels 20 lbs. per acre.

MANGELS—TEST OF VARIETIES.

Number.	Name of Variety.	Yield per acre.							
		1st Plot.				2nd Plot.			
		Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
1	Triumph Yellow Globe	38	296	1,271	36	32	152	1,069	12
2	Prize Winner Yellow Globe	33	264	1,104	24	30	984	1,016	24
3	Prize Mammoth Long Red	32	1,472	1,091	12	29	344	972	24
4	Selected Yellow Globe	32	416	1,073	36	32	680	1,078	..
5	Yellow Intermediate	31	1,624	1,060	24	20	1,976	699	36
6	Half Sugar White	31	304	1,038	24	29	1,928	998	48
7	Selected Mammoth Long Red	29	1,400	990	..	27	1,968	932	48
8	Half Sugar Rosy	28	1,288	954	48	25	1,216	853	36
9	Lion Yellow Intermediate	27	1,176	919	36	26	1,856	897	36
10	Mammoth Long Red	27	384	906	24	28	760	946	..
11	Mammoth Yellow Intermediate	26	1,856	897	36	27	120	902	..
12	Giant Sugar Mangel	26	1,856	897	35	24	840	814	..
13	Gate Post	26	1,064	884	24	19	1,864	664	24
14	Leviathan Long Red	26	272	871	12	22	1,144	752	24
15	Giant Yellow Intermediate	25	1,744	862	24	25	1,216	853	36
16	Giant Yellow Globe	24	312	805	12	21	768	712	48

EXPERIMENTS WITH CARROTS.

As in the case of other roots, the yield of carrots was below the average. The average of the New White Intermediate for five years has been 24 tons 576 lbs., or 809 bushels 36 lbs.

Ten varieties were sown on light clay loam, in rows 18 inches apart, May 8 and May 22. They were pulled October 10. The yield per acre has been calculated from two rows each 66 feet long.

CARROTS—TEST OF VARIETIES.

Number.	Name of Variety.	Yield per acre.							
		1st Plot.				2nd Plot.			
		Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
1	Carter's Orange Giant	21	1,120	718	40	13	840	447	20
2	Giant White Vosges	20	1,360	689	20	19	1,600	660	..
3	Long Yellow Stump Rooted	20	480	674	40	19	1,160	652	40
4	Early Gem	20	40	667	20	19	720	645	20
5	Improved Short White	19	1,160	652	40	18	1,840	630	40
6	Ontario Champion	19	720	645	20	18	520	608	40
7	Half Long Chantenay	18	1,400	623	20	20	40	667	20
8	New White Intermediate	18	960	616	..	19	1,600	660	..
9	Mammoth White Intermediate	18	80	601	20	1	120	535	20
10	White Belgian	14	160	469	20	17	760	579	20

EXPERIMENTS WITH SUGAR BEETS.

Eight varieties of these roots were tested this year. Of these only three are recommended for use in the manufacture of sugar, viz., Vilmorin's Improved, Wanzleben and French Very Rich. All the varieties are, however, particularly useful as food for stock. We find young animals relish them better than either mangels or turnips.

The first plots were sown on May 23 and the second on June 9. The early sown plots gave the largest returns in every instance. All were harvested on October 8.

The estimate of yield per acre has been made from the product of two rows each 66 feet long. The soil was a black sandy loam fertilized with ten loads of well rotted manure per acre. The previous crop was potatoes.

Repeated chemical analyses of sugar beets grown here would indicate that their growth in Manitoba for the profitable manufacture of sugar is doubtful. For full information on this point the inquirer is directed to the reports of Mr. F. T. Shutt, Chemist of the Dominion Experimental Farms, Ottawa.

Sugar Beets—Test of Varieties.

Number.	Name of Variety.	Yield per acre.							
		1st Plot.				2nd Plot.			
		Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
1	Danish Red Top	26	800	880	..	24	1,632	827	12
2	Royal Giant	22	1,672	761	12	21	240	704	..
3	Improved Imperial	21	1,824	730	24	19	1,072	651	12
4	Red Top Sugar	20	1,448	690	48	20	392	673	12
5	Danish Improved	20	920	682	..	20	656	677	36
6	Wanzleben	16	1,792	563	12	15	624	510	24
7	French Very Rich	16	1,264	554	24	18	168	602	48
8	Vilmorin's Improved	15	624	510	24	15	96	501	36

EXPERIMENTS WITH POTATOES.

The uniformly large yields and excellent quality of potatoes grown here prove the remarkable adaptability of Manitoba soil and climate to this valuable tuber.

The sandy loam soil chosen for these plots received about ten loads of well rotted manure to the acre and was ploughed deeply in the fall and spring.

The Colorado Beetle appeared on a few hills, but one application of Paris green destroyed them all.

The yield was not equal to the phenomenal yield of 1905, but was large and the quality was very fine. The following eight varieties have averaged, for five years, over 500 bushels to the acre:—American Wonder, 545; Dreer's Standard, 533; Late Puritan, 533; State of Maine, 529; Uncle Sam 522; Empire State, 517; Money Maker, 516; Maule's Thoroughbred, 504.

The potatoes were planted May 21, in rows three feet apart, with the sets about one foot apart in the rows, and were dug October 2. There were no rotten ones and very little scab.

POTATOES—TEST OF VARIETIES.

Number.	Name of Variety.	Character of Growth	When Matured.	Average Size.	Yield per acre.						Form and Colour.
					Total		Marketable.		Unmarketable.		
					Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	
1	Vermont Gold Coin	Strong	Oct. 1	Very large	495	..	473	..	22	..	White, round.
2	Reeve's Rose	"	Sept. 1	"	491	20	473	..	18	20	Lt. pink, oval
3	American Wonder	"	" 10	"	484	..	469	20	14	40	White, long.
4	State of Maine	"	Oct. 1	"	484	..	458	20	25	40	White, flat oval
5	Uncle Sam	"	Sept. 29	"	469	20	440	..	29	20	White, flat.
6	Carman No. 1	"	" 15	"	451	..	421	40	29	20	"
7	Pearce	Medium	Aug. 28	Large	447	20	436	20	11	..	Pink, round.
8	Morgan Seedling	Strong	Not ripe	Very large	443	40	429	..	14	40	" long.
9	Sabean's Elephant	"	Sept. 1	"	436	20	421	40	14	40	White, long.
10	Dreer's Standard	"	" 25	"	436	20	414	20	22	..	White, flat oval
11	Empire of State	"	" 12	Medium	429	..	414	20	14	40	White, long.
12	Late Puritan	"	" 20	Large	421	40	407	..	14	40	Wh., round, lg.
13	Money Maker	Medium	" 12	"	418	..	403	20	14	40	White, kidney.
14	I. X. L.	Strong	" 5	"	414	20	392	20	22	..	Pink, long.
15	Bovee	Weak	Aug. 20	"	407	..	359	20	47	40	"
16	Maule's Thoro'bred	Medium	Sept. 5	"	403	20	388	40	14	40	Pink, long, flat.
17	Burnaby Seedling	"	" 5	"	392	20	377	40	14	40	Pink, oval.
18	Early Envoy	"	Aug. 30	"	392	20	370	20	22	..	Pink, round.
19	Irish Cobbler	"	" 30	M. to L.	385	..	355	40	29	20	White, flat.
20	Holborn Abundance	Strong	Not ripe	Large	374	..	366	40	7	20	" round.
21	Dooley	"	Sept. 15	Very large	363	..	348	20	14	40	" "
22	Everett	Medium	Aug. 20	"	359	20	330	..	29	20	Pink, long.
23	Carman No. 3	"	Sept. 8	Medium	344	40	330	..	14	40	White, long.
24	Ashleaf Kidney	Strong	Aug. 30	....	341	..	330	..	11	..	
25	Canadian Beauty	Medium	Sept. 16	M. to L.	337	20	330	..	7	20	Lt. pink, long.
26	Rochester Rose	Weak	Aug. 30	Medium	337	20	300	40	36	40	" "
27	Dalmeny Beauty	Strong	Sept. 20	Very large	311	40	297	..	14	40	White, oval.
28	Country Gentleman	"	Aug. 25	"	300	40	300	40	....		Pink, long.
29	Early Rose	Weak	" 30	Medium	289	40	264	..	25	40	" round.
30	Pingree	Medium	" 29	"	278	40	256	40	22	..	White, oval.
31	Vick's Extra Early	Strong	" 25	Very large	260	20	227	20	33	..	" pink, flat.
32	Early White Prize	Weak	" 31	Large	256	40	238	20	18	20	Lt. pink, oval.

EXPERIMENTS WITH GRASSES.

The season of 1906 was not favourable for the growth of grasses. They all suffered from lack of rain during the growing period. The weather was good for curing.

Below will be found the yields of six plots for the past four years. In each case the seed was sown on well prepared land, without a nurse crop.

It will be noted that Alsike mixed with Timothy has done well, giving hay of very superior quality. Alsike in this plot has done better than Red Clover mixed with Timothy.

Brome has done well, but after four crops must be broken.

New plots will be sown in the spring.

GRASSES.

Variety.	Sown.	1903.	1904.	1905.	1906.
		Lbs.	Lbs.	Lbs.	Lbs.
Timothy	1903	....	2,700	4,200	2,100
Timothy and Alsike	1903	....	....	5,400	2,940
Awnless Brome (*Bromus inermis*)	1902	2,300	4,700	5,900	3,080
Hard Fescue (*F. duriuscula*)	1900	3,850	3,800	5,000	2,470
Western Rye grass (*A. tenerum*)	1902	2,220	4,500	4,100	1,080
Red Top (*A. vulgaris*)	1903	....	1,900	4,600	900

EXPERIMENTS WITH CLOVERS.

The winter of 1905-06 was hard on the clovers. Where there was little snow, they killed quite seriously. The best practice is to have sufficient clover left in the fall to hold the snow.

ONE ACRE PLOTS.

In 1904 three acres were sown, an acre each to Common Red, Alfalfa and Alsike. The field was swept bare of snow during the winter of 1905-06 and the Common Red and Alsike were almost wholly killed, while the Alfalfa was partly killed.

The Alfalfa gave 1,045 lbs. at one cutting. The other plots were ploughed.

SMALLER TEST PLOTS.

The following table shows the returns from the one-twentieth acre plots. The second crop of Alfalfa was left for seed, but no seed matured before frost.

Smaller Test Plots.

Variety.	Sown.	Height.	Stage when Cut.	Yield of Hay per Acre.	
		Inches.		Tons.	Lbs.
Alfalfa	1903	44	¼ in bloom	1	800
Alfalfa	1902	45	¼ in bloom	1	400
Alsike and Timothy	1903	27—40	Full bloom	1	940
Common Red	1902	29	Full bloom	1	420

ON GRAVELLY UPLAND.

In May, 1905, Alfalfa and Common Red Clover and Western Rye grass were sown on light gravelly upland, both with and without a nurse crop. There was a good catch on all the plots, but the clovers and Rye grass made better growth where there was no nurse crop. The plots were neither mown nor pastured. The situation was exposed to the N.W. wind and but little snow covered them.

The clovers were practically all winter killed. The Western Rye grass yielded in 1906, 1 ton 1,550 and 1,850 lbs. of hay, that sown without a nurse crop doing the better.

RESULTS OF ELEVEN YEARS.

So much interest is now shown in clovers, and so many inquiries are received, that it is thought best to give, as briefly as possible, the conclusions reached after a careful study of all the experiments made here with clovers during the past eleven years.

In 1895 a series of ten experiments in growing clover with a nurse crop showed that the clover does not reduce the yield of grain, but actually increases it in most cases. In these experiments clover was grown with wheat, oats, barley and pease. Unfortunately this clover, Mammoth Red, was killed the next winter.

The results of many experiments with White Dutch and Crimson clover would indicate that they are not suited to this climate.

Mammoth Red Clover has been grown with fair success, but it is too coarse to be desirable.

The many experiments with Alsike have not been very encouraging, excepting in one plot where it was sown with Timothy. This plot has done so well and has given such excellent hay that I would recommend farmers to try it. However, it is not safe to base conclusions on one single experiment, hence only small plots should be risked.

The results of four careful experiments with Common Red clover, extending over three or four years in each case, have been decidedly gratifying. In each case the seed has been sown without a nurse crop and upon spring ploughed stubble. The weeds were mown twice during the summer and left on the ground as a mulch. Care was taken to have enough clover standing in the fall to hold a snow cover. In estimating the average yield, I take into consideration the first year, when no crop was harvested, as well as the following years, when hay was gathered, and these four experiments show an average of 3,060 lbs. per year of excellent feed. This is probably as profitable as any crop we can grow.

The results of four experiments with Alfalfa have been yet more encouraging. With land in good heart, a fine and solid seed bed, about 25 lbs. of seed to the acre, there has not been a failure. One small plot, on light, wind-swept upland, with gravel subsoil, was killed the first winter. No snow lay on this. A bare plot of an acre was partially killed last winter. This will be disced and re-sown in the spring, in the hope that the weak spots may be restored.

The average yield from the four experiments, counting the seeding year as above, has been 3,400 lbs. per year. Analysis shows that nothing makes better feed, for cattle especially. It should be cut when the blossoms first appear If left later it is too woody. In harvesting, handle carefully and as little as possible. The leaves, which are the best feed, are easily broken off. We would strongly advise every farmer to try a small plot.

The value of clovers in adding materially to the fertility of the soil is an element of great importance. Not only do they add much directly to the soil, but they also add value to the manure.

EXPERIMENTS WITH MILLETS.

Six varieties were tested, in one-twentieth acre plots, on black sandy loam, summer-fallowed. They were all sown June 5 and harvested September 5.

The Common and Hungarian make excellent feed for cattle, but should be fed sparingly to horses.

When the head is well formed millet should be cut with the binder, in small sheaves, and cured in the stook.

While the Common and Hungarian make a large quantity of excellent hay, the others are too coarse.

EXPERIMENTS WITH MILLETS.

Variety.	Description.	Height.	Stage when Cut.	Hay per Acre	
		Inches.		Tons.	Lbs.
Hungarian	Fine quality	41	Fully headed	6	1,100
Italian	Coarse	53	$\frac{1}{10}$ headed	6	130
Common	Fine quality	40	Nearly ripe	4	1,800
White Round French	Coarse	48	Nearly ripe	4	1,700
Algerian	Very coarse	76	$\frac{3}{4}$ headed	4	1,200
Pearl	Coarse	52	Not headed	3	1,200

CATTLE.

The herd of cattle now on the Experimental Farm consists of twenty-three animals, exclusive of twelve fattening steers, as follows:—

No.	Name of Animal.	Breed.	Age.	Weight.
				Lbs.
1	Christie	Grade—Female.	9 years	1,320
2	Gretchen	" "	3 "	1,520
3	Sis	" "	3½ "	1,260
4	Jenny	" "	3 "	1,510
5	Margaret	" "	2 "	1,410
6	Ruben	" "	2 "	1,570
7	Julia	" "	2 "	1,095
8	Louise	" "	12 months	710
9	Buttercup	" "	2 "	150
10	Blanche	" "	2 "	110
11	Rose	Shorthorn—Female	3½ years	1,420
12	Crocus	" "	3 "	1,295
13	Daisy	" "	2½ "	1,275
14	James	" Male	2 "	1,460
15	Jane	" Female	13 months	695
16	Lily	Ayrshire—Female	4½ years	1,295
17	Snowball	" "	2 "	995
18	Westward Ho!	" "	12 months	590
19	Buster Brown	" Male	4 "	260
20	Marie	Guernsey—Female	2 years	930
21	Duke	" Male	2 "	1,290
22	Togo	" "	9 months	510
23	Nemo	Shorthorn—Male	1 month	110

EXPERIMENTS IN FEEDING STEERS.

The eight animals used for this experiment were Shorthorn grades of fair quality, purchased from a farmer near Oak River, Manitoba. They were purchased in November, 1905, and the feeding began December 5. They cost delivered, $3 per hundred pounds live weight and were sold April 27, 1906, for $4.40 live weight.

The purpose of the experiment was to compare the value of oat sheaves and fodder corn. For this purpose they were divided into two groups of four each, as equally as possible.

All were tied in stalls and, excepting in their feed, were treated as nearly alike as possible. All were two years coming three.

The daily ration was:—

GROUP 1.

Corn fodder	23 lbs.
Ensilage	17 "
Turnips	10 "
Chop 4 lbs., increased to	9 lbs.

GROUP 2.

Oat sheaves	20 lbs.
Ensilage	17 "
Turnips	10 "
Chop 4 lbs., increased to	9 "

COST OF FEED.

Group 1—

13,248	lbs. of fodder corn at $4 per ton	$ 26 45
9,792	" ensilage at $2 per ton	9 79
5,760	" turnips at 5 cts. per bushel	4 80
3,744	" ground grain and screenings at ¾ cent	28 08
		69 12
4,450	" at 3 cents	133 50
		$202 62
5,235	" at $4.40	230 34
	Gain	$ 27 72
	Gain per steer	$ 6 93

Group 2—

11,520	lbs. of oat sheaves at $6 per ton	$ 34 56
9,792	" ensilage at $2 per ton	9 79
5,760	" turnips at 5 cents per bushel	4 80
3,744	" ground grain	28 08
		77 23
4,485	" at 3 cents	134 55
		211 78
5,345	" at $4.40	235 18
	Gain	$ 24 40
	Gain per steer	$ 6 10

SUMMARY.

——	First cost of each Steer.	Value of feed consumed.	Price per Steer sold.	Gain per day.		Profit per Steer.
	$ cts.	$ cts.	$ cts.	Lbs.	ozs.	$ cts.
Corn group	33 37	17 28	57 58	1	6	6 93
Oat sheaf group	33 64	19 31	58 79	1	8	6 10

It is thought that the prices charged are the fair values of the feed on the farm. If the manure is equal in value to the labour, then the above represents the profit per steer. It was planned to give each steer the same weight, 23 lbs., of cut oat sheaves or cut corn stalks, but it was found that the oat sheaves had to be reduced to 20 lbs.

MILKING COWS.

For various reasons the number of milking cows has been reduced and several young cattle have taken their places. None of these younger cows has yet completed a full period of lactation, hence we can report upon four only.

The following table gives the length of the milking period, the number of pounds of milk, the average daily yield, and the percentage of butter fat.

Name.	Age.	Breed.	Days.	Pounds of Milk.	Daily Average.	Percentage butter-fat.
Christie..	9 years.	Grade	427	11,243¼	26·6	3·5
Gretchen.	8 "	"	271	10,095½	37·2	3·6
Jenny	3 "	"	266	4,269½	16	4·8
Lily.	4½ "	Ayrshire.	318	4,854½	15·8	5·1

The grade cows Christie and Gretchen are not only valuable milkers, but their calves are of superior quality. A steer, calf of Gretchen, now weighs 1,600 lbs. at just 30 months.

EXPERIMENTS WITH SWINE.

In this line a new experiment, which will extend over a series of years, has been inaugurated. To begin with, a drove of six, of the best pure breds obtainable, has been assembled, viz.: 1 Berkshire male and 1 female; 1 Yorkshire male and two females; 1 Tamworth female. Pure Berkshires, pure Yorkshires and crosses with Berkshire and Yorkshire males and Tamworth females will be bred.

The first cost, the feed, an estimate of the pasture, the labour and repairs to quarters will be charged against the herd; while it will be credited with animals sold, service, manure and stock on hand at the end of each year. The year, for this purpose will begin with December 1. An effort will be made to secure two litters from each sow each year. The financial results will be reported.

EXPERIMENTS WITH POULTRY.

During the year no special experiments with poultry have been conducted. The incubator was not used and the hatching was not very successful.

Barred Plymouth Rocks, White Wyandottes and Rose Comb Minorcas have been kept.

EXPERIMENTS WITH BEES.

Early in April the bees, fourteen hives, were removed from their winter quarters in the cellar to their place in the arboretum. They all came out in good condition and needed no feeding.

Hives in the spring	14
New swarms	15
Absconded	2
Queen died, colony dwindled	1
Found empty in fall	1
Sold	2
Weak colonies united	2
Went into winter quarters in good condition	21

During past years every effort has been made to increase the quantity of honey and to reduce the number of swarms. This plan seems to have reached its limit for this year; nothing could stop swarming. They ran to swarms rather than to honey.

CASH STATEMENT.

255 lbs. honey at 10 cents	$ 25 50
2 hives sold	14 00
7 additional hives	49 00
	88 50
Less 9 hives and frames bought	18 00
Net profit	$ 70 50

Steers were purchased at $33 each, fed and cared for all winter and had a net profit of $6.50.

Our hives of bees costing $7 each with infinitely less care, netted $5 each, and that in a bad year for honey.

The value of these bees in fertilizing the blossoms, especially of fruits and clovers, cannot be estimated.

HORTICULTURE.

The season of 1906 was, taken as a whole, a very favourable one for the horticulturist. The weather permitted an early commencement of operations in the spring, and the absence of late spring frost, coupled with the exceptionally open fall, contributed to the perfect ripening of all late vegetables and fruits. In the vegetable garden, following the precedent established some years ago, a few varieties were given special attention, all the kinds obtainable of each one being tested. Beans and lettuce were the varieties chosen for 1906 and much valuable information was obtained from the notes taken during the season.

In the larger fruits more promising results are being obtained each year. The introduction, by Dr. W. Saunders, of the *Pyrus baccata* has given to the Northwest a stock for apple grafting, the thorough hardiness of which, coupled with the good union it makes with other varieties renders it all that can be desired for this purpose.

Propagation is carried on by means of root grafting, one or two year old roots being used for this purpose. Upon these roots scions of the most hardy and promising trees, such as, Hibernal, Duchess, Transcendent, No. 100, and No. 179, are being grafted. The best results from this method have been accomplished by lifting the roots in the fall and storing them in boxes filled with alternate layers of soil and roots, and bringing them into a cellar about March and gradually thawing them out before using. In past years the scions were also taken in the fall and stored in a similar manner, but the results were not satisfactory and much better result have been attained by cutting the scions just prior to grafting. By the latter plan about 90 per cent will usually take, while with the former method rarely 50 per cent could be obtained. The whole operation is simple and we would suggest that all who have an opportunity, should help in this good work by attempting it, if even in a small way, themselves.

APPLES.

Since this Experimental Farm was established some eighteen years ago many hundreds of trees, of the many varieties of apples in cultivation have been tested, and, in the vast majority of cases, have been killed by the severity of the climate or by sun scald, before they have borne fruit.

HIBERNAL.

Trees of this variety have been many times tested during the past 18 years, but all died prior to 1901, when three specimens of Hibernal grafted on *Pyrus prunifolia* roots were sent here from the Central Experimental Farm. Though in an exposed position only the tips of some of the branches have been slightly killed. In 1905, it bore a crop of apples. These apples were about 3½ inches in diameter, of good flavour and excellent for cooking. In the spring of 1906 this tree was so severely cut for scions that it did not bear fruit.

DUCHESS OF OLDENBURG.

This variety also has been many times tried since the farms were established, but has not been successful. Scions of this apple were top grafted on a Berried Crab, in 1902. In 1905 the grafts bore a good crop of excellent fruit. In 1906 it again bore a crop, but not so many apples, probably on account of being severely cut for scions. These apples were about 2½ inches in diameter, which is under the normal size. They ripened well and were excellent for cooking.

NO. 100.

This tree is in an out of the way position and the fruit is generally stolen before fully ripe. For several years it has borne a fair crop of apples, good for eating or cooking. It is small, only about an inch and a half in diameter, but it is hardy and well worth growing.

NO. 179.

This is supposed to be a cross-bred originated on the Central Experimental Farm, Ottawa, by Dr. Saunders. Unfortunately the records of its parentage have been lost. Since 1904, this tree has borne apples measuring 2⅞ x 2⅝ inches, as large as the Duchess and quite as good. It ripened early in September and kept well until January. It is a good cooking apple and also pleasant for eating. The tree seems to be quite hardy. Scions from it have been grafted on Berried crab roots so as to multiply the trees for further trial.

The fact that these trees, having no protection whatever from winter-killing or summer sun scald, are bearing fruit, is very encouraging and should stimulate us to further trial.

CRAB APPLES.

Crab apples of many kinds are now grown on this farm in large quantities. In the early days of the work here almost all the larger named sorts killed considerably, but in time the hardier kinds showed greater hardiness and for the past two or three years several of them have borne fruit.

HYSLOP.

The largest and the handsomest is the Hyslop. The tree now under test seems to be hardy although trees earlier planted have died, the fruit is somewhat larger than the Transcendent. It keeps well and is good for cooking.

MARTHA SEEDLINGS.

Several seedlings of the Martha are proving themselves to be hardy, are heavy bearers, and the fruit in some instances seems to be as large as the original Martha. These trees are somewhat subject to blight.

TRANSCENDENT.

The trees of this variety sent to Brandon in the early history of the farm perished, but of late the trees have become much hardier and bear fruit of excellent quality, and in considerable quantities, especially when grafted on *Pyrus baccata*. Trees of this variety are said to be doing well in many parts of the province.

CROSS-BRED AND SEEDLING APPLES.

While there is a hope that some of the well known varieties of the larger apples will, in time, become acclimatized, yet in all probability the best apples of the future, for Manitoba, will be found among the cross-bred kinds or among new seedlings.

It is worthy of note that many of the best varieties of cultivated apples, such as the Northern Spy, Baldwin, Fameuse, McIntosh Red and others are chance seedlings, probably from the fruit of blossoms, which have been cross-fertilized by insects.

The search for valuable new varieties of seedlings or from crossing is very slow work, yet if but one valuable new apple should result among thousands of failures, it would more than repay all the time and labour spent. By grafting, the new and valuable variety could be multiplied indefinitely.

We would suggest that farmers should sow apple seeds and plum pits freely and plant the seedlings in orchards or as windbreaks, and in time enough fruit would be borne which would determine the quality. One man is as likely as another to hit upon something good.

CROSS-BREDS AND SEEDLINGS.

A large number of cross-bred apples have been produced at the Central Experimental Farm, Ottawa, from year to year and these have been sent to the Brandon Farm. A large number of seedlings from these crosses have also been sent here for trial. In most cases the *Pyrus baccata* has been one parent, chosen to secure hardiness and it has been crossed with many different kinds of esteemed eastern sorts to secure size and quality.

Some few of the cross-breds have fruited and although the fruit of most of them does not exceed 1½ inches in diameter they cook well and some of them are good for eating. They are very useful for domestic purposes and deserving of more extended trial. A few of the seedlings have also fruited, but most of them have been too small to be of value, except for the making of jelly. There are still about 1,000 of seedlings of the cross-bred apples planted on the farm, which have not yet fruited.

RASPBERRIES.

The raspberry plantation, consisting of several varieties, was a total failure this year, no fruit being produced, as a result of the total killing back of the canes last winter. The growth of 1905 was exceptionally luxuriant and continued until frost. As a consequence the wood went into winter quarters in a very green condition and was killed to the ground. For several years the canes have been bent down in the fall and covered with long horse manure. This manure was left between the rows as a mulch. Probably the land became too rich, resulting in abnormal and long continued growth of the canes. This is the first complete winter-killing of raspberries for many years.

STRAWBERRIES.

The Everbearing Alpine strawberry, planted in the spring of 1905, wintered well and bore fruit continuously most of the summer. The plot was small and the birds and boys made it impossible to get a record of the quantity of fruit. The fruit is of good size and flavour.

A new cross-bred seedling was received in the spring of 1906, from Prof. Hansen, of South Dakota. It is a cross between the Jessie and the Manitoba wild strawberry. The growth was vigorous and the few berries allowed to ripen were fine and large.

PLUMS.

During past years many cultivated varieties and seedlings have been tested, but in nearly all cases the fruit is too late in ripening.

The Native Manitoba plum is probably the stock from which our future plums will come. Persistent planting of pits and weeding out the poorer sorts will no doubt, in time, produce excellent plums, which will be early and hardy.

GOOSEBERRIES.

The winter was very hard on this fruit. Of twenty-five varieties under test the majority were winter-killed and there was very little fruit.

CURRANTS.

Thirty-three varieties of red, white and black currants are under test. The crop this year was light. Unfortunately, just at our busiest time, when it was impossible to give them attention, the currant worm did serious damage and reduced the crop to almost nothing.

Of the red currants the following are among the best in yield and quality: Pomona, Large Red, New Red Dutch and Red Dutch.

Of the white, the following: White Cherry, Verriers White and Large White.

Of the black, the following: Sterling, Standard and Star.

THE ARBORETUM.

No additions have been made to the Arboretum during the year. Many trees and shrubs have so increased in size that much thinning must be done before adding many other new varieties for testing.

The Russian poplars on the side hill are still further damaged by the fungus which is weakening the stems. Quite a few have been broken by the wind and have become unsightly.

But few of the cottonwoods are left. The leaf fungus is killing them one by one. On the low lands they do well.

Especial notice is called to the following hardy, handsome and very desirable ornamental trees:

Manitoba Maple (*Acer Negundo*), excellent in all situations; Native Paper or Canoe Birch (*Betula papyrifera*); American Mountain Ash (*Pyrus Americana*); White Spruce (*Picea alba*); Balsam Spruce (*Abies balsamea*); Tartarian Maple (*Acer tataricum*); Ginnalian Maple (*Acer tataricum Ginnala*); Sharp-leaved Willow (*Salix acutifolia*); Laurel-leaved Willow (*Salix pentandra*); Siberian Berried Crab (*Pyrus baccata*); American Elm (*Ulmus Americana*).

The following hardy and attractive flowering shrubs are especially recommended:

Siberian Pea Tree (*Caragana arborescens, C. frutescens pendula, C. pygmaea*); Native Hawthorn (*Crataegus coccinea*); Sharp-leaved Cotoneaster (*Cotoneaster acutifolia*); Common Cotoneaster (*C. integerrima*); Bush Honeysuckle (*Lonicera spinosa* and *L. tatarica*); Neillia (*Neillia opulifolia*); Philadelphus or Mock Orange (*Philadelphus grandiflora*).

The following may be added to this list: Spiraea (*Spiraea Van Houttei*); Lilacs (*Syringa vulgaris Charles X., S. v. alba gradiflora, Madame Casimir Perier,* and *S. Josikaea*).

PHILADELPHUS (MOCK ORANGE).

This beautiful shrub was for many years past considered too tender to be successfully grown in Manitoba, the wood killing back to the ground each winter. An experiment was made a few years ago to endeavour to preserve the wood by laying down and covering with manure. The experiment was successful, and since that time all of the specimens of this variety growing on the farm have been treated in a similar manner with the result that the bushes are covered each summer with their beautiful and extremely fragrant blossoms. There are several varieties growing on the farm, the best of which is the Philadelphus grandiflora.

VEGETABLE GARDEN.

LETTUCE.

This year a special test of all obtainable varieties of lettuce was made.

Forty-nine varieties were sown on May 1 by hand, in rows 2 feet apart. On account of the moist condition of the soil the germination was prompt and all the varieties were well represented. The results of the test are given below in their order of productiveness:—

Name.	Flavour.	Texture.	Weight per head.		Date went to Seed.	
			Lbs.	ozs.		
Cos Trianon	Good	Tough	1	7	July	30
All Year Round	Good	Firm		8	"	20
Wheeler's Tom Thumb	Good	Tender		12	"	20
Neapolitan	Very good	Tender	1	3	"	20
Toronto Globe	Good	Firm	1	6	"	25
Trocadero	Fair	Tender		8	"	20
Red Edged Victoria	Sweet	Tender		11	"	1
Blond Stonehead	Good	Firm	1	5	"	28
White Paris Cos	Good	Firm	1	4	"	29
Paris Green Cos	Very good	Firm	1	2½	"	12
Simmers' Nonpareil	Fair	Loose	1	2	"	26
Giant Glacier	Fair	Tough	1	13	"	23
Early Green Curled	Very good	Tender	1	11	"	30
Early Curled Simpson	Poor	Loose	2	8	"	18
Denver Market	Good	Firm	1	12	"	21
Drumhead	Poor	Tough	1	11½	·	3
Early Hanson	Good	Firm	1	9	"	23
Early Prizehead	Poor	Loose	1	5	"	16
Big Boston	Fair	Loose	1	6	"	20
Toronto Gem	Good	Firm	1	6½	"	23
Grand Rapids	Very bitter	Tough	1	9	"	10
Asparagus	Poor	Tough	1	0	"	9
Maltese Cabbage	Fair	Tough	1	10	"	11
Gardener's Favorite	Sweet	Tender	2	4	"	25
Mignett	Good	Firm	0	12	"	10
Californian Cream Butter	Fair	Loose	1	15	"	22
Wonderful	Fair	Firm	1	15	"	25
Black Simpson	Fair	Firm	1	7	"	24
May King	Very good	Very tender	0	15	"	11
Tennisball White Seeded	Poor	Loose	2	0	"	23
Iceberg	Sweet	Firm	1	8	"	18
Hubbard Market	Sweet	Firm	0	15	"	23
Improved Salamander	Good	Loose	1	3½	"	20
Maximum	Good	Loose	0	12	"	16
Deacon	Fair	Loose	0	9	"	11
New York	Poor	Tough	1	6½	"	30
Buttercup	Sweet	Tender	0	8	"	23
Golden Queen	Good	Tender	1	8	"	8
Green Hammersmith	Poor	Bitter	0	15	"	6
Emperor William	Poor	Firm	1	0	"	23
Large Yellow Butter	Poor	Tough	1	1	"	6
Giant Crystal Head	Very sweet	Tender	1	2½	"	15
Black-seeded Tennisball	Sweet	Tender	1	2	"	20
Cold Frame Cabbage	Good	Loose	1	5	"	8
Continuity	Very good	Tender	1	7	"	18
Large Boston Market	Good	Loose	0	6½	"	8

BEANS.

In like manner a special test was made of all obtainable varieties of beans.

Twenty-five varieties were sown on May 31, and all germinated well. All varieties did well, and all ripened their seeds. Below is given, in tabular form, the results of this test, coupled with short notes on those kinds deemed worthy of special mention. Sown by hand in rows 30 inches apart, and afterwards thinned to 3 inches apart in the row.

Name of Variety.	Ready	Number in Pod.	Productive.	Length of Pod.	Colour.	Flavour.
	July.			Inches.		
White Seeded Wax	27	6	Very	6	Light yellow	Very good.
Black Seeded Wax	27	5	"	4	" "	Fair.
Giant Dwarf Bean	28	7	"	7	Dark "	Very good.
Flageolet	27	6	Fairly	5	" "	"
Davis White Wax	26	6	Very	4½	Light "	"
Golden Wax	25	4	Fairly	4½	Dark "	"
Keeney's Wax	29	4	Very	4½	Light "	Good.
Wardwell's Wax	26	5	Fairly	4	Dark "	Fair.
Detroit Wax	23	4	"	4	" "	Good.
Saddleback	24	5	"	5	Light "	Very good.
Early Golden Wax	22	4	"	5¼	Dark "	"
Early Giant Wax	22	4	Very	6¼	" "	"
Improved Prolific	26	4	Fairly	3½	Light "	Good.
Golden Eyed Wax	29	4	"	4¾	" "	"
Currie's Rust Proof	28	5	Very	5	Dark "	"
Thorburn's Stringless	28	4	"	4¼	Light "	"
Pencil Pod Wax	29	4	Fairly	5	Dark "	Fair.
Round Pod Kidney	29	5	"	3½	Light "	"
Dwarf Extra Early	21	4	Not very	5	Green	"
Dwarf Golden Stringless	23	4	Fairly	4½	Light yellow	Good.
Gloire de Vitry	21	5	"	5¾	Green	Very good.
Dwarf Black Speckled	22	5	Very	6	"	"
Dwarf Wax Every Day	22	4	"	4	Yellow	Fair.
Emperor of Russia	23	5	"	6	Green	Very good.
Dwf. Matchless	26	4	Fairly	5	"	"

The following varieties are worthy of special mention:—

Gloire de Vitry.—A green bean of fair length and very productive.

Early Giant Wax.—A yellow bean producing a fairly long pod and very productive; a good variety for general purposes.

Dwarf Matchless.—A green podded bean, long and fairly productive.

Emperor of Russia.—This is a very fine bean, of excellent quality. The pods are borne in great profusion and very productive.

GARDEN TURNIPS.

Garden turnips were a very unsatisfactory crop this season, their quality for table use being very poor, doubtless on account of so much dry weather. Four varieties, viz., Early Stone, White Milan, Early White Strapleleaved and Robertson's Golden Ball were sown with a hand drill on May 15 in rows 30 inches apart, Robertson's Golden Ball being by far the best.

BEETS.

Five varieties of beets, viz., Nutting's Dwarf Improved, Long Blood Red, Egyptian Beet, Extra Early and Extra Early Blood Red, were sown with a hand drill in rows 30 inches apart on April 29, and the sample of roots was far below the average. Extra Early Blood Red was the heaviest, yielding at the rate of 520 bushels 32 lbs. per acre.

ONIONS.

The onion crop this year was very satisfactory. Seven varieties were sown on April 11 with Planet Junior hand drill, in rows one foot apart. The seed germinated readily and all varieties ripened well. The yield came well up to the average. In the following table they are arranged in the order of productiveness.

Name of Variety.	Ripe.	Colour.	Harvested.	Yield per Acre.	
				Bush.	Lbs.
Danver's Yellow Globe	Sept. 6	Light yellow	Sept. 15	527	33
Trebon's Yellow	" 6	"	" 15	560	24
Market Favourite Keeping	" 6	Dark yellow	" 15	490	..
Prize-taker Red Globe	" 3	" red	" 15	532	15
Giant Yellow Globe	" 6	Yellow	" 15	521	..
Giant Prize-taker	" 12	"	" 15	426	13
Australian Brown	" 13	Light brown	" 15	315	..

PARSNIPS.

Two varieties of parsnips were tested this year, viz., Hollow Crown and Elcombe's Giant. They were sown in rows one foot apart and thinned to about 6 inches apart. Hollow Crown gave by far the best results both in size and flavour.

SQUASH AND PUMPKINS.

Several varieties of squash and pumpkins were tested this year, including the English vegetable marrow, which is greatly appreciated as a vegetable. It was undoubtedly the best of the varieties tried. Pumpkins failed to ripen, with the exception of one named 'Sweet or Sugar.'

CABBAGES.

Eleven varieties of cabbage were sown under glass April 5, and when large enough to handle were transplanted to boxes and set in a cold frame. They were planted outside on May 22. All the plants survived and did well. In the following table they are arranged in order of their earliness:—

Variety.	Ready for use.	Description.	Average weight.
			Lbs.
Early Paris	June 28	Poor	6½
Fottler's Improved	July 15	Solid	7
Extra Early Express	" 3	Very firm	6¼
Early Winningstadt	" 1	"	5½
Express	" 10		
Paris Market	" 10	Firm	7
Late Dutch Drumhead	Sept. 1	Good	8½
Quintal Drumhead	Aug. 5	Very firm	13
Early Jersey Wakefield	July 10	Very good	10
Green Globe Savoy	Sept. 1	Good	6½
Dark Red Dutch	Aug. 15	Rather loose	9
		Very small	4

CARROTS.

Two varieties of carrots, viz., Early French Horn and Intermediate were sown on April 20 with hand drill, in rows eighteen inches apart. The crop was below the average yield, the roots being very small and deformed.

CAULIFLOWER.

Three varieties of cauliflowers were tested this season. Earliest Erfurt was the best. The seed was sown under glass, April 5, and when the plants were large enough to handle they were pricked off into boxes and transplanted May 23 to the open ground. The following are the results in order of earliness.

Variety.	Ready for use.	Description.	Average weight.
			Lbs.
Early Paris	June 28	Poor	2½
Early Snowball	" 30	Fairly good	3
Earliest Erfurt	July 20	Very good	4¼

CUCUMBERS.

The cucumber crop was a very satisfactory one, both in yield and quality. Six varieties, viz., Short Green Gerkin, Improved Long Green, Cumberland, Giant Pera, Long Parisian, Short Green, were sown on May 31 in hills six feet apart each way. Some plants of the Telegraph were grown under glass, which kept up a large supply of cucumbers all summer, some measuring 25 inches long.

GARDEN PEASE.

Four varieties of garden pease, viz., American Wonder, Shropshire Hero, Yorkshire Hero and Nott's Excelsior, were sown in the open on May 3rd in double rows 3 feet apart. The germination was good and a splendid crop was gathered. A late variety, Shropshire Hero, was sown on the 15th of June and produced an abundant crop all through September.

TOMATOES.

Two varieties of tomatoes, viz., Earliana and Early Dwarf Stone, were grown. The latter did not do well, only a comparatively few ripening. The former, on the other hand, did remarkably well, giving a continuous and heavy crop of most excellent fruit from August 5 till the first heavy frost late in September.

SWEET CORN.

Three varieties of corn were sown this year, but none of them ripened any seed. The following are the results obtained from this test:—

Varieties.	Sown.	Ready for use.	Flavour.
New Premo	May 15	Aug. 10	Very good.
Extra Early White Cory	" 15	" 10	"
Sweet Peep o'Day	" 15	" 21	Good.

THE FLOWER GARDEN.

The flower garden this year proved a great attraction to visitors, and drew forth much favourable comment. The mixed border was especially admired, the combination of the various colours of annuals and perennials forming a magnificent display.

Owing to the very bright weather experienced during the early spring, large healthy plants were available at planting out time. Thirty-eight varieties were sown in boxes under glass between April 1 and 15, transplanted April 19 to 30, and bedded out June 1 to 5. Some seeds of several varieties, saved from plants grown on the farm the previous year, were sown for comparison with imported seed. The germination was good, while the resulting flowers showed very little deterioration from their originals. Asters were a great success, and produced fully 85 per cent of perfect blossoms.

ANNUALS SOWN OUTSIDE.

A large variety of annuals were sown in the open borders on May 1 Owing to a very favourable spring, they germinated well and made a fine display of bloom which lasted well on to the end of September.

IRIS.

A number of Iris bulbs were received from the Central Experimental Farm in the fall of 1905, and were planted in the perennial border on the hillside, among these were English Iris (*Iris Anglica*) and Spanish Iris (*Iris Hispanica*), but these are too tender for this climate. An experiment was tried to protect them by placing over them a heavy covering of about 4 feet of strawy manure. The covering was taken off in the spring, but on examination, the bulbs were found to be rotted.

TULIPS.

A consignment of Tulip bulbs, received from Ottawa in the fall of 1905, was planted in the flower garden, in beds occupied during the summer by annuals. Nearly all grew and made a fine display of colour during the spring months, which was greatly appreciated at a time when flowers are extremely scarce. As soon as the tulips were over, annuals were planted between the rows, care being taken to avoid injuring the bulbs, and thus an almost constant succession of flowers was kept up during the entire season.

PEONIES.

Nearly all the older varieties under test bloomed well. Several varieties of Japanese peonies were received from the Central Experimental Farm in the fall of 1905, and planted in the collection of perennials. All came through alive last spring, and most of them flowered, making a valuable addition to the stock of perennials.

DAHLIAS.

On May 28, a consignment of Dahlias was received from the Central Farm, consisting of the following varieties, and although they were planted late, some very fair blooms were produced.

Grand Duke Alexis,
Prince of Orange,
Mrs. Chas. Turner,
Lady H. Grosvenor,
Capstan,
Empress of India,
Mrs. Pearce,
Wm. Agnew,
Mrs. Langtry,
Harry Stredwick,
Jessie McIntosh,
Mrs. Beedle,
Louis Hariot,
Clifford W. Bruton,
Prince Imperial,
Cactus Queen,
Nymphæa,
Ernest Glasse,
Kynerith,
Iridescent,
Cochineal,
Cannell's Gem.

CANNAS.

A number of cannas were also received from Ottawa in the spring of 1906. These were potted on arrival and placed in the greenhouse to give them a start. As soon as the weather permitted, they were planted outside, and all flowered well, among them were some very fine specimens. On October 12, all were lifted and removed to the cellar of the Superintendent's house.

NARCISSUS.

This beautiful spring-flowering bulbous plant gets winter-killed unless given exceptionally heavy covering. Last season some bulbs of the varieties known as Sir Watkin, Emperor and Barri Conspicuus, were planted in the fall and came up and flowered beautifully in the spring. This gives us reason to hope that we may yet succeed in growing this extremely beautiful flower.

ROSES.

Fourteen varieties of roses were received from the Central Experimental Farm in the spring of 1906, only seven of which were alive when winter set in. These are named in the following list. They were laid down, and covered with soil for winter protection.

Mercédès,
Belle Poitevine,
Roseraie de l'Hay,
Rugosa Alba,
Souvenir de Philemon Cochet,
Delicata,
Madam Plantier.

DISTRIBUTION OF GRAIN, POTATOES, FOREST TREES, SHRUBS, &c.

Seedling trees and shrubs, packages	350
Potatoes in 3 lb. bags	180
Wheat in 3 lb. bags	162
Oats in 3 lb. bags	80
Barley in 3 lb. bags	50
Pease in 3 lb. bags	18
Maple seed in 1 lb. bags	50
Rhubarb seed in papers	12
Total	902

Number of farmers reporting on their experience on oats	5
“ “ “ “ wheat	12
“ “ “ “ barley	2
“ “ “ “ potatoes	60

Largest yield from 3 lbs. wheat (Red Fife)	110 lbs.
“ “ 3 “ oats (Banner)	68 “
“ “ 3 “ barley (Mensury)	48 “
“ “ 3 “ potatoes (Rochester Rose)	210 “
“ “ 3 “ pease (Macoun)	26 “

METEOROLOGICAL OBSERVATIONS FOR BRANDON, MAN.

Months.	Highest Temperature.		Lowest Temperature.		Total Rainfall.	Total Snowfall.	Total Sunshine.
1905.	Day.	Deg.	Day.	Deg.	Inches.	Inches.	Hours.
December	11	37	3	—24	....	6·0	93·1
1906.							
January	31	38	22	—34	....	....	118·3
February	9	47	10	—36	....	....	127·1
March	29	58	22	—15	....	....	150·1
April	17	83	4	6	0·98	....	197·7
May	11	84	6	15	3·24	0·20	137·2
June	13	84	22	35	4·13	....	191·9
July	10	91	17	38	1·67	....	256·2
August	13	94	31	35	2·10	....	233·3
September	7	100	29	26	0·86	....	220·3
October	2	74	30	10	0·97	0·6	159·1
November	5	47	20	—16	....	20·9	82·5
December	19	26	12	—38	....	41·0	63·7
1907.							
January	2	17	15	—44	....	24·5	124·1
February	17	36	5	—46	....	2·5	151·1
March	24	46·8	13	—17·2	0·15	14·0	193·0

VISITORS.

During the year a very large number of farmers and others, estimated at about 15,000 in all, have visited the farm.

The Women's Press Association of Pennsylvania, to the number of 150, made a careful inspection in June.

The General Press Association of the United States, during their stay in Brandon, paid particular attention to the farm.

Many of the Bankers' Excursion from the United States were especially anxious to learn of the agricultural possibilities of the province, as shown in the crops and records here.

A considerable deputation representing Australian investors spent much time on the farm, gathering information for their report to those who sent them.

Numbers from New Zealand, the Argentine, India, Japan (including the Hon. Tatsugoro Nossé, Consul General) and many of the European countries were all intent upon learning of the possibilities in the Canadian West.

Owing to some misunderstanding between the Farmers' Institutes and the Grain Growers' Association, there were no farmers' excursions to the Brandon Experimental Farm during the year.

EXHIBITION WORK.

Large quantities of samples for exhibition purposes were prepared for the Exhibition Branch and the Immigration Department of the Federal Government. These were sent to the British Isles and foreign countries.

Exhibitions were prepared and placed at the Brandon Summer and Winter Fairs. These received much attention and favourable comment.

CORRESPONDENCE.

Since the issue of the last annual report 4,114 letters were received and 4,089 answered, irrespective of circulars sent out.

MAILING LIST.

Residents of Manitoba who desire to receive copies of the separate annual report for this province, will please write to the Superintendent at Brandon, and their names will be put on the mailing list. Those desiring the full report and bulletins should make application to the Director of Experimental Farms, Ottawa.

I have the honour to be, sir,
Your obedient servant,
N. WOLVERTON,
Superintendent.

Cattle at Experimental Farm, Indian Head, Sask.

EXPERIMENTAL FARM FOR SASKATCHEWAN

Experimental Farm, Indian Head, Sask.,
March 30, 1907.

Dr. Wm. Saunders, C.M.G.,
Director, Dominion Experimental Farms,
Ottawa.

Sir,—I have the honour to submit to you the nineteenth annual report of the operations on the Experimental Farm for the Province of Saskatchewan, at Indian Head, Sask., during the year 1906.

The past season was on the whole favourable for crops of all sorts over this province and Alberta. Spring wheat, oats and barley gave good crops as a rule, in all sections of the country.

Very little snow fell in the winter of 1905-06, and little or no severe weather was experienced anywhere.

Spring opened early in April with seeding under full headway by the 10th. No delay was caused by unfavourable weather, and as the soil was never before in a better condition for the horses and drills, the work was quickly completed.

Grain germinated evenly, and with abundant moisture in nearly all sections of the country, the growth was very satisfactory. At one time it promised a repetition of 1905's immense crop of straw, but fortunately a warm wave passed over the country early in July, checking the excessive growth. A second hot wave on August 13, brought in the harvest with a rush, but at the same time reduced the yield by several bushels per acre.

Harvest was general on August 20, and the weather being ideal for the work, it was early and inexpensively completed.

Threshing started without delay on completion of harvest, and like the harvest was finished the earliest on record.

The crops on the Experimental Farm were not as satisfactory or abundant as in the preceding year, but were much more easily harvested and threshed, and on the whole gave good returns.

The first and only hailstorm that has ever injured crops on the Experimental Farm passed over it on July 24. All crops were injured more or less, but the fields of Red Fife, Stanley, Percy and Huron wheats, and two-rowed barley, on the southeast part of the farm received the greatest damage. This hailstorm passed in a southeasterly direction, and unfortunately did great damage to many fine fields of grain for 10 miles.

EXPERIMENTS WITH WHEAT.

The crop of wheat on experimental plots and field lots was very promising until the hailstorm passed over the farm. In no case was the straw extra heavy or lodged. While it is impossible to say how much, the yields were reduced by the hail, about one-third of the grain when threshed was found to be quite small and shrunken, caused, no doubt, by he straw being broken down and the circulation being stopped, as at the time the grain was only partially filled.

SPRING WHEAT—TEST OF VARIETIES.

Sixteen varieties were sown on April 11, on backsetting, soil clay loam, at the rate of 1½ bushels of seed per acre. Sown by the drill. Size of plots, one-twentieth acre.

WHEAT—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw including Head.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.		Weight per measured bushel after cleaning.
				In.		In.		Lbs.	Bush.	Lbs.	Lbs.
1	White Fife	Aug. 21	132	47	Strong	4	Bald	5,580	48	40	59½
2	Preston (Ottawa Selected)	" 16	127	46	"	4	Bearded	4,280	46	..	61
3	Stanley	" 13	124	46	"	3¾	Bald	6,280	45	20	60
4	Bishop	" 8	119	46	"	3¼	"	3,380	44	..	61
5	Early Java	" 24	135	43	"	4¼	Bearded	2,580	44	..	61¾
6	Red Fife	" 22	133	44	"	3¾	Bald	6,300	43	40	62½
7	Laurel	" 20	131	44	Medium	4	"	4,100	43	40	62
8	Huron (Ottawa Sel.)	" 18	129	42	Strong	3¾	Bearded	6,440	42	40	60
9	Huron	" 10	121	42	"	3½	"	4,180	42	20	61
10	Herisson Bearded	" 17	128	46	"	2½	"	3,460	42	20	62½
11	Red Fern	" 10	121	50	"	4	"	2,980	42	..	62
12	White Hungarian	" 10	121	41	"	4	"	4,880	41	20	61¾
13	Percy	" 13	124	44	"	3¼	Bald	3,820	41	20	61
14	White Russian	" 21	132	46	"	3½	"	4,580	41	..	60½
15	White Fife (Ottawa Sel.)	" 23	134	48	"	3	"	5,220	41	..	61½
16	Colorado	" 10	121	47	"	4	Bearded	5,120	39	40	62¾
17	Preston	" 10	121	40	"	3½	"	3,800	39	20	61
18	Pringle's Champlain	" 10	121	44	"	3½	"	4,700	39	..	61
19	Laurel (Ottawa Sel.)	" 24	135	47	"	4	Bald	4,860	39	..	59½
20	Percy (Ottawa Sel.)	" 15	126	46	"	3½	"	4,500	37	..	60
21	Stanley (Ottawa Sel.)	" 15	126	48	"	4¼	"	5,800	36	40	59½
22	Riga	" 10	121	43	"	3	"	3,200	35	20	60½

WHEAT—TEST OF VARIETIES IN FIELD LOTS.

Nine varieties of wheat were sown in field lots, on fallowed land, clay loam, at the rate of 1½ bushels of seed per acre. Huron, Red Fife, Stanley and Percy would have been higher up in the list but for the injury by hail.

WHEAT—TEST OF VARIETIES IN FIELD LOTS.

Name of Variety.	Size of Plot.	Date of Sowing.	Date of Ripening.	Number of Days Maturing.	Length of Straw including head.	Character of Straw.	Length of Head.	Kind of Head.	Yield per Acre.		Weight per measured bushel after cleaning.
	Acres.				In.		In.		Bush.	Lbs.	Lbs.
Preston	9¾	Apl. 13	Aug. 15	124	44	Strong	3½	Bearded	38	18	
Pringle's Champlain	4¾	" 12	" 17	127	42	Medium	3½	"	36	34	
Bishop	1	" 17	" 13	118	44	"	3¼	Bald	34	23	
Huron	3	" 16	" 13	119	43	Strong	3½	Bearded	34	..	
Riga	1½	" 17	" 13	118	43	"	3	Bald	29	15	61
Red Fife	16½	" 14	" 22	130	44	"	3	"	26	31	
Stanley	3¾	" 13	" 13	122	47	"	3½	"	25	8	
Percy	3½	" 13	" 13	122	47	"	3¼	"	24	51	
White Fife	2	" 14	" 23	131	49	"	3½	"	24	51	

Wheat Crop and Average Yield.

Variety.	Cultivation.	Acres.	Yield per Acre.		Total Yield.	
			Bush.	Lbs.	Bush.	Lbs.
Preston	Fallow	9¾	38	18	373	26
Pringle's Champlain	"	4¾	36	34	173	42
Bishop	"	1	34	23	34	23
Huron	"	3	34	..	102	..
Riga	"	1½	29	15	43	53
Red Fife	"	16¼	26	31	430	36
Stanley	"	3¾	25	8	94	14
Percy	"	3½	24	51	87	..
White Fife	"	2	24	51	49	42
		45½			1,388	56

An average of 30 bushels 31 pounds per acre.

WHEAT.—FOUR YEARS, COMPARISON OF FIELD LOTS.

Below are shown the average yield per acre and average time to mature of five varieties of wheat, grown under similar conditions for the past four years.

Variety.	Average Days to Mature.	Days earlier than Red Fife.	Average Yield per Acre.	
			Bush.	Lbs.
Huron	128½	11	41	6
Preston	130	9½	40	18
Red Fife	139½		36	..
Stanley	130	9½	32	58
Percy	131	8½	29	51

WHEAT.—TEST OF FERTILIZERS.

Six plots of one-fortieth acre each were sown with Red Fife wheat on April 11, by hoe-drill, at rate of 1½ bushels per acre. Soil clay loam.

Fertilizers per Acre.	Date of Ripening.	No. of Days Maturing.	Length of Straw including Head.	Character of Straw.	Length of Head.	Weight of Straw.	Yield per Acre.		Weight per measured bushel after cleaning.
			In.		In.	Lbs.	Bush.	Lbs.	Lbs.
Plot No. 1—Nitrate of soda, 100 lbs. per acre (half sown when grain was 2-in. high, balance when 6-in. high)	Aug. 25	136	44	Strong	4	6,240	38	..	60
Plot No. 2—Nitrate of soda, 200 lbs. per acre (half sown when grain was 2-in. high, balance when 6-in. high)	" 25	136	44	"	4	5,240	38	..	60¾
Plot No. 3—Superphosphate No. 1, 400 lbs. per acre (sown before grain and harrowed)	" 25	136	44	"	4	6,880	38	20	60
Plot No. 4—Check plot, unfertilized	" 25	136	42	"	4	4,800	35	20	61
Plot No. 5—Muriate of potash, 200 lbs. per acre (sown before grain and harrowed)	" 25	136	43	"	4	5,760	48	40	60½
Plot No. 6—Superphosphate No. 1, 200 lbs. per acre; muriate of potash, 100 lbs. per acre; nitrate of soda, 100 lbs. per acre (half sown before grain and harrowed, balance when grain was 2-in. high)	" 25	136	43	"	4	3,520	37	20	59

MACARONI WHEAT.—TEST OF VARIETIES.

Four varieties were sown on April 11, on backsetting, clay loam, at rate of 1½ bushels seed per acre. Plots one-twentieth acre.

Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw including Head.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.		Weight per bushel.
			In.		In.		Lbs.	Bush.	Lbs.	Lbs.
Yellow Gharnovka........	Aug. 22	133	52	Medium..	2½	Bearded..	2,040	52	40	64½
Goose........	" 22	133	50	" ..	2¾	" ..	2,360	51	40	65½
Mahmoudi.....	" 23	134	43	" ..	2¼	" ..	2,100	49	..	64
Roumanian........	" 22	133	48	" ..	2¾	" ..	2,320	47	40	66

EMMER AND SPELT.

Two varieties of Emmer and two of Spelt were sown on April 17, on one-twentieth acre plots of backsetting, clay loam, by hoe-drill. One-half acre of Common Emmer was also sown on April 25.

Name of Variety.	Date of Ripening.	No of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.
			In.		In.		Lbs.	Lbs.
Red Spelt.................	Aug. 21	126	38	Strong ...	3½	Bald	3,800	3,600
Common Emmer.....	" 20	125	33	Medium .	2	Bearded..	3,440	3,220
White Spelt	" 24	129	37	Strong ...	5	Bald	4,540	3,160
Red Emmer	" 24	129	36	" ...	3¼	Bearded..	4,400	2,980
Common Emmer..	" 20	117	43	Weak	2	" ..	....	2,680

SUMMER FALLOWS.

In view of the great importance of properly preparing land for crops, and of the large number of new settlers coming into the country, I make no excuse for repeating what was said in my last three reports respecting summer-fallows, and breaking up and cultivating new prairie land.

It is very gratifying to know that throughout the Northwest, summer-fallowing is rapidly becoming general. No matter where farming is carried on, the farmers realize that to be sure of a crop they must prepare a portion of their land the year before the crop is grown, and apart from the value of the stored moisture, there is the inestimable advantage of keeping weeds from overrunning the farm.

The true worth of properly prepared fallows has been clearly demonstrated in past years in every grain-growing district of Saskatchewan.

The work of preparing land for crop by fallowing is carried on in so many ways in different parts of the Northwest, that perhaps a few words on some of the methods employed may be of help to at least some of the new settlers.

It has been observed in Alberta and Saskatchewan that the land to be fallowed is not, as a rule, touched until the weeds are full grown and in many cases, bearing fully matured seed. It is then ploughed.

By this method, which, no doubt, saves work at the time, the very object of a summer-fallow is defeated. In the first place, moisture is not conserved because the land has been pumped dry by the heavy growth of weeds; and, secondly, instead of using the summer-fallow as a means of eradicating weeds, a foundation is laid for years of labour and expense by the myriads of foul seeds turned under.

The endless fields of yellow-flowered weeds, generally Ball Mustard (*Neslia vaniculata*), testify to the indifferent work done in many districts, and, while no weed is more easily eradicated by a good system of fallows, there is no weed that is more easily propagated or takes greater advantage of poor work on fallows or of fall or spring cultivation.

As has been pointed out in my previous reports, early and thorough work on fallows is absolutely necessary to success, and I here repeat the methods and results of tests carried on for some years past.

First Method.—Ploughed deep (6 to 8 inches) before last of June; surface cultivated during the growing season, and just before or immediately after harvest ploughed 5 or 6 inches deep.

Result.—Too much late growth if season was at all wet; grain late in ripening, and a large crop of weeds if the grain was in any way injured by winds.

Second Method.—Ploughed shallow (3 inches deep) before the last of June; surface cultivated during the growing season, and ploughed shallow (3 to 4 inches deep) in the autumn.

Result.—Poor crop in a dry year; medium crop in a wet year. Not sufficiently stirred to enable soil to retain the moisture.

Third Method.—Ploughed shallow (3 inches) before the last of June; surface cultivated during the growing season, and ploughed deep (7 to 8 inches) in the autumn.

Result.—Soil too loose and does not retain moisture. Crop light and weedy in a dry year.

Fourth Method.—Ploughed deep (7 to 8 inches) before the last of June; surface cultivated during the growing season.

Result.—Sufficient moisture conserved for a dry year, and not too much for a wet one. Few or no weeds, as all the seeds near the surface have germinated and been killed. Surface soil apt to blow more readily than when either of the other methods is followed. For the past fourteen years, the best, safest and cleanest grain has been grown on fallow worked in this way, and the method is therefore recommended.

Fallows that have been ploughed for the first time after the first of July, and especially after July 15, have never given good results; and the plan too frequently followed of waiting till weeds are full grown, and often ripe, and ploughing under with the idea of enriching the soil, is a method that cannot be too earnestly advised against.

In the first place, after the rains are over in June or early in July, as they usually are, no amount of work, whether deep or shallow ploughing, or surface cultivation, can put moisture in the soil. The rain must fall on the first ploughing and be conserved by surface cultivation.

Weeds, when allowed to attain their full growth, take from the soil all the moisture put there by the June rains, and ploughing under weeds with their seeds ripe or nearly so, is adding a thousand-fold to the myriads already in the soil, and does not materially enrich the land.

METHODS OF PREPARING NEW GROUND.

In view of the fact that every year brings to the Northwest many new settlers who are unacquainted with the methods of breaking up and preparing new land for crop, a few suggestions with regard to this very important work may not be amiss.

In all sections where the sod is thick and tough, breaking and back-setting should be done; while in districts where scrub abounds and the sod is thin, deep breaking is all that is necessary.

The former is generally applicable to the southern parts of Saskatchewan and the latter to Alberta and the northern parts of Saskatchewan, where the land is more or less scrubby.

SHALLOW-BREAKING AND BACK-SETTING.

The sod should be turned over as thin as possible, and for this purpose a walking plough with a 12 or 14-inch share, is the best. When the breaking is completed (which should not be later than the second week in July), rolling will hasten the rotting process and permit back-setting to commence early in August.

Back-setting is merely turning the sod back to its original place, and at the same time bringing up two or three inches of fresh soil to cover it. The ploughing should be done in the same direction as the breaking and the same width of furrow turned. Two inches below the breaking is considered deep enough, but three to four inches will give better results.

After back-setting, the soil cannot be made too fine, and the use of disc or Randall harrow to cut up every piece of unrotted sod, will complete the work.

DEEP BREAKING.

Deep breaking, which in many sections of the country is the only practicable way of preparing new land, and which is, unfortunately, done in some instances where breaking and back-setting would give more satisfactory results, consists in the turning over of the sod as deeply as possible, usually from four to five inches.

When the sod has rotted, the top soil should be worked and made as fine as possible. The use of harrow and disc will fill up all irregularities on the surface, and make a fine, even seed-bed.

Whether the land is broken shallow or deep, it is necessary to have the work completed early, so as to take advantage of the rains which usually come during June or early in July. These rains cause the sod to rot, and without them, or if the ploughing is done after they are over, the sod remains in the same condition as when turned, and no amount of work will make up for the loss.

To some districts near the foot-hills of the mountains and in districts where scrub abounds and the sod is thin, these remarks may not apply; but as a rule, throughout the Northwest early breaking, whether deep or shallow, is advisable.

WORKING LAND AFTER FIRST CROP.

Inquiries are often made as to what should be done after taking off the first crop on new land, the question being as to whether the land should be ploughed, or cultivated, or sown without any cultivation whatever.

This, however, can only be determined by circumstances. In districts with heavy clay soil, a satisfactory crop may be expected from burning the stubble of the former crop and sowing with or without cultivation, although a shallow cultivation after the stubble is burnt usually gives the best results.

In districts with light soils and especially with gravelly subsoil, cultivation before seeding is necessary.

After taking the second crop from breaking or back-setting, there can be no doubt that the land should be well fallowed to put it in proper condition for succeeding crops. If the fallow is well made and the process repeated every third year, the settler will have started on the right road to future success.

EXPERIMENTS WITH OATS.

The oat crop, except in the small plots, was disappointing. The hail on July 24, and the excessive heat on August 13, the first coming just when the grain was forming and the latter before it had matured, were a combination against large yields.

The uniform plots were sown on Western Rye Grass sod, broken up the previous year. The field lots were on fallowed land.

OATS—TEST OF VARIETIES.

Thirty-nine varieties were sown on April 23, on one-twentieth acre plots of backsetting. Soil, clay loam. Sown by hoe drill, at rate of 2 bushels of seed per acre.

OATS—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw including Head.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.		Weight per measured bush. after cleaning.
				In.		In.		Lbs.	Bush.	Lbs.	Lbs.
1	Banner	Aug. 22	121	46	Medium	9	Branching	3,220	128	28	40
2	Bavarian	" 22	121	45	"	8	"	2,980	124	4	38
3	Improved Ligowo	" 20	119	48	"	9	"	4,020	122	32	37
4	Goldfinder	" 24	123	46	"	9	"	2,820	119	14	38
5	White Giant	" 13	112	48	Strong..	9	"	3,060	117	2	37½
6	Golden Fleece	" 20	119	44	"	9	"	3,980	115	30	38½
7	Kendal Black	" 22	121	47	"	10	Sided.. ..	5,800	115	10	41
8	Mennonite	" 17	116	44	Medium	8	Branching	5,120	114	24	39
9	Golden Beauty	" 21	120	47	"	10	"	4,260	114	4	39
10	Thousand Dollar	" 18	117	47	"	8	"	3,840	112	12	38
11	Irish Victor	" 20	119	48	"	9	"	3,740	112	12	38½
12	Golden Giant	" 24	123	44	Strong..	10	Sided.....	3,780	112	12	38
13	Columbus	" 22	121	47	Medium	9	Branching	2,500	111	26	38
14	Improved American	" 20	119	45	"	9	"	5,000	111	26	39
15	Holstein Prolific	" 20	119	50	Strong..	9	"	3,080	111	6	38
16	Sensation	" 22	121	47	Medium	10	"	4,020	109	14	40
17	American Triumph	" 20	119	46	"	8	"	4,120	108	8	38
18	Joanette	" 18	117	42	Strong..	8	"	3,340	107	22	37
19	Kendal White	" 23	122	45	Medium	9	"	4,100	107	2	39
20	Milford White	" 23	122	50	"	9	Sided.....	2,960	105	30	40½
21	Twentieth Century	" 21	120	48	"	9	Branching	3,860	103	18	38½
22	Tartar King	" 20	119	49	"	11	Sided.....	2,880	103	18	39½
23	Danish Island	" 18	117	38	Strong..	9	Branching	3,260	102	32	38
24	Lincoln	" 20	119	46	Medium	9	"	3,340	102	32	39
25	Welcome	" 20	119	48	"	9	"	4,300	102	32	40
26	Waverley	" 22	121	49	"	10	"	2,140	102	12	40
27	Pioneer	" 16	115	48	Strong..	8	"	5,780	100	..	40
28	American Beauty	" 20	119	45	Medinm	10	"	2,240	98	28	36
29	Siberian	" 23	122	47	"	9	"	2,940	97	2	36
30	Swedish Selected	" 17	116	48	"	8	"	4,760	95	10	38½
31	Wide Awake	" 16	115	38	Strong..	8	" "	2,780	94	24	38
32	Black Beauty	" 20	119	44	Weak ..	8	"	3,540	94	24	39
33	Olive Black	" 16	115	50	Medium	10	Sided.....	5,140	93	18	..
34	Abundance	" 14	113	43	Strong..	9	Branching	3,280	92	32	38
35	Storm King	" 22	121	52	Medium	11	Sided.....	3,940	90	20	39
36	Virginia White	" 21	120	48	"	9	Branching	2,340	87	22	41½
37	Milford Black	" 20	119	47	Strong..	10	Sided.....	4,020	87	22	39
38	Buckbee's Illinois	" 14	113	48	"	10	Branching	4,560	87	2	38¼
39	Baxter's July	" 2	101	50	Weak...	6	"	2,380	78	8	34

OATS—FIELD LOTS.

Eleven varieties were sown in field lots, on clay loam, fallowed, at rate of two bushels seed per acre.

Name of Variety.	Size of Plot.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Length of Straw including head.	Character of Straw.	Length of Head.	Kind of Head.	Yield per Acre.	
	Acres.				In.		In.		Bush.	Lbs.
Banner	11¼	April 20	Aug. 16	118	48	Strong. .	9	Branching	87	21
Black Beauty	2¼	" 23	" 11	110	44	" . .	9	" .	81	6
Wide Awake	4¾	" 21	" 16	117	44	" . .	9	" .	80	20
White Giant	4	" 20	" 11	113	47	" . .	9	" .	79	26
Abundance	2½	" 23	" 16	115	46	" . .	8	" .	77	28
Goldfinder	1¾	" 23	" 13	112	48	" . .	8	" .	77	2
Danish Island	5¼	" 20	" 13	115	40	" . .	9	" .	73	30
Tartar King	4¼	" 23	" 10	109	52	" . .	8	Sided.	73	12
Thousand Dollar	5	" 21	" 10	111	38	" . .	8	Branching	63	10
Improved Ligowo	5¼	" 21	" 10	111	46	" . .	8	" .	63	9
Welcome	2¾	" 21	" 11	112	37	" . .	8	" .	59	25

Average and Total Yield.	Acres.	Yield per Acre.		Total Yield.	
		Bush.	Lbs.	Bush.	Lbs.
Banner	11¼	87	21	985	24
Black Beauty	2¼	81	6	182	22
Wide Awake	4¾	80	20	382	27
White Giant	4	79	26	319	2
Abundance	2½	77	28	194	9
Goldfinder	1¾	77	2	134	38
Danish Island	5¼	73	30	387	30
Tartar King	4¼	73	12	311	26
Thousand Dollar	5	63	10	316	16
Improved Ligowo	5¼	63	9	332	6
Welcome	2¾	59	25	164	9
	49	. . . .	. . . .	3,712	5

An average yield of 75 bushels 25 pounds per acre.

OATS.—FOUR YEARS COMPARISON OF FIELD LOTS.

Below are shown the average yield per acre and time to mature of eight varieties of oats, grown under similar conditions for the last four years.

Variety.	Average Days to Mature.	Average Yield per Acre.	
		Bush.	Lbs.
Banner	116¾	99	32
Wide Awake	116½	88	14
Abundance	118¼	87	17
Black Beauty	115¼	86	31
Goldfinder	116½	84	3
Thousand Dollar	114¼	79	10
Tartar King	112½	78	27
Improved Ligowo	115¼	78	9

EXPERIMENTS WITH BARLEY.

The yield of barley was satisfactory except from five varieties grown on the south part of the farm, where hail did the greatest damage. These were Invincible, Standwell, Sidney and Canadian Thorpe, in two-rowed and Royal in six-rowed varieties. While the other lots, as well as the uniform test plots, were struck with the hail, the injury was comparatively small.

The uniform plots of barley, like the oat and wheat plots, were grown on Western Rye Grass sod, and the field lots on fallowed land.

BARLEY—TEST OF VARIETIES.

Fourteen varieties of two-rowed barley were sown in one-twentieth acre plots on backsetting, on May 1, by the hoe drill at rate of 2 bushels per acre. Soil, clay loam.

Eighteen varieties of six-rowed barley were sown on same date and under similar conditions.

TWO-ROWED BARLEY—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw including head.	Character of Straw.	Length of Head.	Weight of Straw.	Yield per Acre.		Weight per measured bushel after cleaning.
				In.		In.	Lbs.	Bush.	Lbs.	Lbs.
1	Danish Chevalier	Aug. 11	102	38	Medium	4	4,240	60	..	50
2	Sidney	" 6	97	36	"	3	3,000	54	2	53
3	Jarvis	" 8	99	38	Weak	3½	2,860	52	44	52
4	Clifford	" 6	97	42	"	4	2,080	52	24	51½
5	Gordon	" 7	98	44	Strong	2¾	3,000	52	24	51½
6	Invincible	" 9	100	35	Medium	3	3,720	52	24	50
7	Standwell	" 9	100	34	"	9¾	4,120	52	24	51
8	Canadian Thorpe	" 11	102	37	Strong	3	3,800	48	16	51½
9	Swedish Chevalier	" 11	102	33	Weak	4	3,200	47	24	52
10	Harvey	" 6	97	40	Medium	4	3,520	46	32	51½
11	Logan	" 8	99	43	Weak	3¼	2,580	46	12	50½
12	French Chevalier	" 12	103	33	"	3½	2,520	41	12	51
13	Beaver	" 11	102	34	Strong	3½	3,900	40	20	52
14	Dunham	" 6	97	36	"	3	3,180	39	8	53¼

SIX-ROWED BARLEY—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of straw including head.	Character of Straw.	Length of Head.	Weight per Acre.	Yield per Acre.		Weight per measured bushel after cleaning.
				In.		In.	Lbs.	Bush.	Lbs.	Lbs.
1	Odessa	Aug. 5	96	35	Medium..	2¾	3,440	65	40	50½
2	Blue Longhead	" 6	97	32	" ..	2¾	3,600	64	8	44
3	Common	" 3	94	38	Weak....	2	3,480	60	40	52
4	Mensury	" 8	99	42	"	3	2,800	57	24	51
5	Oderbruch	" 3	94	38	"	2	3,600	55	..	52½
6	Empire	" 6	97	34	Medium..	2½	2,760	55	..	51
7	Trooper	" 3	94	38	Strong....	2½	2,240	53	36	50
8	Mansfield	" 8	99	38	Weak.....	2¾	2,140	52	44	51½
9	Yale	" 7	98	37	"	3	2,300	52	4	50½
10	Royal	" 2	93	37	Medium..	2½	2,500	50	40	50½
11	Nugent	" 9	100	38	Weak.....	2½	2,909	49	28	51
12	Summit	" 5	96	33	"	2	3,820	48	36	49½
13	Argyle	" 3	94	41	Medium..	2¾	2,640	47	44	50½
14	Stella	" 9	100	36	Weak.....	3	2,760	47	44	52
15	Claude	" 9	100	36	Medium..	2¼	2,380	46	12	50
16	Brome	" 8	99	33	" ..	3¼	3,860	44	28	52
17	Albert	" 6	97	37	Strong....	2½	3,040	42	24	51
18	Champion	" 1	92	40	Weak.....	2¼	2,320	41	32	45

BARLEY—TEST OF VARIETIES IN FIELD LOTS.

Ten varieties of barley were sown on fallowed land, clay loam, at rate of two bushels seed per acre.

Name of Variety.	Size of Plot.	Date of Sowing.	Date of Ripening.	No. of days Maturing.	Length of Straw, incl'di'g head.	Character of Straw.	Length of Head.	Kind of Head.	Yield per Acre.	
	Acres.				In.		In.		Bush.	Lbs.
Claude	4¾	April 30..	Aug. 7..	99	46	Weak	2½	Six-rowed ..	58	28
Odessa	5	" 30..	" 8..	100	40	"	2½	" ...	57	7
Mensury	2	May 1..	" 4..	95	43	"	2½	" ...	54	20
Mansfield	4¾	" 1..	" 8..	99	46	" ...	2¼	" ...	46	8
Mensury	9	April 30..	" 8..	100	46	Medium. .	2½	" ...	43	4
Standwell	2½	May 2..	" 16..	106	34	" ..	3	Two-rowed .	30	3
Sidney	3	" 2..	" 14..	104	30	" ..	4	" ..	25	40
Invincible	2	" 2..	" 16..	106	38	" ..	3	" ..	23	44
Canadian Thorpe	2½	" 2..	" 13..	103	46	Strong....	2½	" ..	21	26
Royal	2½	" 1..	" 4..	95	30	Weak	2	Six-rowed .	20	20

BARLEY.—AVERAGE AND TOTAL YIELDS.

Variety.	Acres.	Yield per acre.		Total yield.	
		Bush.	Lbs.	Bush.	Lbs.
Claude	4¾	58	28	278	13
Odessa	5	57	7	285	35
Mensury	2	54	20	108	40
Mansfield	4¾	46	8	219	14
Mensury	9	43	4	387	36
Standwell	2½	30	3	75	8
Sidney	3	25	40	77	24
Invincible	2	23	44	47	40
Canadian Thorpe	2½	21	26	53	41
Royal	2½	20	20	51	2
	38			1585	13

An average yield of 41 bushels 34 pounds per acre.

FOUR YEARS' COMPARISON OF FIELD LOTS OF BARLEY.

Below will be found the average yield and time to mature of nine varieties of barley, grown under similar conditions for the last four years.

Variety.	Average days to mature.	Average yield per acre.	
		Bush.	Lbs.
Claude	107½	62	30
Odessa	103	58	40
Mansfield	106¾	55	45
Mensury	102¼	54	19
Royal	101¼	50	34
Invincible	113½	48	45
Standwell	110¾	46	5
Sidney	106½	45	5
Canadian Thorpe	107¼	39	33

SMUT.

As smut was very prevalent in many crops in 1905, and very serious loss resulted in nearly all districts, special pains were taken before sowing the wheat, oats and barley last spring to effectually overcome all danger from this fungus.

The seed used was free from smut; the bluestone and formalin were pure so far as could be determined; and the treatment was by dipping for 5 minutes.

The results in the wheat tests go to show that treating seed with either bluestone or formalin is not always effectual, and that much has yet to be learned in connection with this serious problem.

Although all the seed wheat, whether in small or large plots, was carefully treated, yet smutty heads were found in every variety sown. In no case, outside the regular smut tests, were there many bad heads, yet with careful search they could be found in all the fields.

It will be observed in the case of the formalin application, that it was not so effectual as bluestone, which is the same result as obtained in former tests on this farm.

With respect to smut in oats and barley, it may be said that while no smutty heads could be found in either the treated or untreated plots, or in any of the uniform tests or field lots, this may be taken as evidence that either the season was not suitable for smut in these grains, or the treatment was effectual.

In the treatment with formalin, the 1 lb. to 15 gallons of water solution killed one-third to one-half of the seed, while the 1 lb. to 30 gallons of water had no injurious effect on the germination.

TEST OF SMUT PREVENTIVES

Treatment.	Date ripe.	Days to Mature.	Smutty heads on 64 sq. ft.
Red Fife Wheat—(Sown April 11).			
Untreated	Aug. 22	133	44
Bluestone, 1 lb. to 5 galls. water	" 23	134	7
" " 10 "	" 23	134	10
Formalin, " 15 "	" 26	137	20
" " 30 "	" 24	135	34
Banner Oats—(Sown April 23).			
Untreated	" 18	117	None.
Bluestone, 1 lb. to 10 galls. water	" 23	122	"
Formalin, " 15 "	" 25	124	"
" " 30 "	" 23	122	"
Canadian Thorpe Barley—(Sown May 1).			
Untreated	" 16	107	"
Bluestone, 1 lb. to 10 galls. water	" 20	111	"
Formalin, " 15 "	" 25	116	"
" " 30 "	" 18	109	"

EXPERIMENTS WITH FIELD PEASE.

Both field and uniform plots were sown on land that had grown roots the preceding year. After the root crop was harvested, the land was ploughed and harrowed. In the spring the seed was sown, and the land harrowed and rolled.

Twenty-four varieties of pease were sown on one-twentieth acre plots on May 2, on clay loam. Three varieties were also sown in field lots.

PEASE—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Character of Growth.	Length of Straw.	Length of Pod.	Size of Pea.	Yield per Acre.		Weight per bushel.
					In.	In.		Bush.	Lbs.	Lbs.
1	Golden Vine	August 20	108	Strong	58	2	Small	45	40	65
2	Prince Albert	" 22	112	"	55	2	"	45	40	65½
3	Early Britain	" 20	110	"	50	2	Medium	45	20	63
4	Duke	" 22	112	"	60	2½	Large	41	20	63½
5	Prussian Blue	" 20	110	"	65	3	Medium	41	..	65½
6	Daniel O'Rourke	" 15	105	"	45	2	Small	41	..	64½
7	Kent	" 21	111	"	50	3	Large	39	..	64
8	Paragon	" 20	110	"	65	3	Medium	39	..	64
9	Chancellor	" 15	105	"	55	2	Small	39	..	63
10	White Wonder	" 18	108	"	60	2½	Medium	38	40	65
11	Nelson	" 18	108	"	50	3	"	38	40	63½
12	Mackay	" 20	110	"	53	3	"	38	..	64½
13	English Gray	" 20	110	"	58	3	"	37	40	62
14	Picton	" 21	111	"	74	2½	Large	36	20	61½
15	Wisconsin Blue	" 22	112	"	58	2	Medium	36	..	65
16	Black Eyed Marrowfat	" 22	112	"	60	3	Small	36	..	64
17	Large White Marrowfat	" 22	112	"	60	3	Large	36	..	64
18	Arthur	" 18	108	"	48	2½	Medium	36	..	64
19	Pearl	" 20	110	"	62	3	Large	36	..	65
20	Gregory	" 20	110	"	60	2½	Medium	34	40	64½
21	Archer	" 22	112	"	70	2	"	34	40	64½
22	Victoria	" 21	111	"	50	3	"	33	20	65
23	Prince	" 20	110	"	58	2½	Large	33	20	64½
24	Agnes	" 20	110	"	55	2	"	30	..	63

PEASE—FIELD LOTS.

Name of Variety.	Character of Soil.	Size of Plot.	Date of Sowing.	Date of Ripening	No. of Days Maturing.	Character of Growth.	Yield per Acre.	
		Acres.					Bush.	Lbs.
Arthur	Clay loam.	2¼	May 2	Aug. 22	112	Strong	42	..
Golden Vine	"	1	" 3	" 20	109	"	39	20
White Wonder	"	½	" 3	" 22	111	"	38	..

GARDEN PEASE ON ONE-TWENTIETH ACRE PLOTS.

Eight varieties of Garden Pease were sown on $\frac{1}{20}$ acre plots beside the other test plots of pease, on May 2, on clay loam and under the same conditions.

Name of Variety.	Date of Ripening	No. of Days Maturing.	Length of Straw.	Length of Pod.	Yield per Acre.		Weight per bushel.
			In.	In.	Bush.	Lbs.	Lbs.
Champion of England	Aug. 20	110	50	2½	42	40	59½
American Wonder	" 13	103	48	2½	36	40	58
Shropshire Hero	" 15	105	42	1½	36	40	58
Premium Gem	" 16	106	52	3	35	20	57½
Stratagem	" 15	105	45	2½	35	20	58
Laxton's Charmer	" 14	104	54	2	34	40	57
Alaska	" 2	92	50	2½	32	..	62
Horsford's Market Garden	" 13	103	44	..	32	..	60

ROTATION OF CROPS.

These tests were commenced in 1899, and below are given the order of rotation for the last three years, and also particulars of yields, &c., for 1906. Each plot is one-half acre in extent, and the soil, clay loam

All these tests were more or less injured by hail. On plot No. 1, the yield was 3½ times larger than on plot No. 13, which was nearly destroyed.

Number.	1904.	1905.	1906.
1	Soja Beans	Wheat	Oats
2	Pease	"	Wheat
3	Tares	"	Oats
4	Red Clover	"	Wheat
5	Alsike and Alfalfa	"	Barley
6	Wheat	Pease	Wheat
7	Oats	Tares	"
8	"	Soja Beans	"
9	Wheat	Red Clover	"
10	Barley	Alsike and Alfalfa	"
11	Summer-fallow	Timothy	"
12	"	Wheat	"
13	"	"	Oats
14	"	"	Barley
15	Oats	"	Wheat
16	"	"	Barley
17	Wheat	Oats	Alsike
18	"	Wheat	Pease
19	"	Oats	Tares
20	"	Wheat	Red Clover
21	"	Barley	Alfalfa
22	"	Common Emmer	Summer-fallow

ROTATION TEST.—SEASON 1906.

Number.	Name of Variety.	Date of Sowing.		Date of Ripening.		No. of Days Maturing.	Length of Straw, including Head.	Character of Straw.	Length of Head.	Kind of Head.	Yield per Acre.		Weight per measured bushel after cleaning.
							In.		In.		Bush.	Lbs.	Lbs.
1	Oats, Banner..................	Apl.	24	Aug.	14	112	43	Strong..	8	Branching	55	30	40
2	Wheat, Red Fife...............	"	16	"	17	123	42	" ..	3	Bald	15	46	60
3	Oats, Banner..................	"	24	"	14	112	44	" ..	8	Branching	49	12	39½
4	Wheat, Red Fife...........	"	16	"	14	120	38	" ..	2½	Bald	19	4	60¼
5	Barley, Mensury...............	"	24	"	4	102	43	" ..	2½	6-rowed...	25	2	46
6	Wheat, Red Fife...............	"	16	"	23	129	40	" ..	3	Bald	21	36	57
7	"	"	16	"	25	131	47	" ..	3	"	20	36	57
8	"	"	16	"	24	130	45	" ..	3	"	19	14	59½
9	"	"	16	"	24	130	45	" ..	3	"	20	22	57
10	"	"	16	"	24	130	44	" ..	3	"	21	46	57
11	"	"	16	"	15	121	34	" ..	2¾	"	19	20	60½
12	"	"	16	"	15	121	38	" ..	3	"	18	16	60
13	Oats, Banner.............	"	24	"	14	112	37	" .	8	Branching	34	4	38
14	Barley, Mensury...............	"	24	"	4	102	38	" ..	2	6-rowed...	15	24	48½
15	Wheat, Red Fife.............	"	17	"	17	122	35	" ..	2½	Bald	13	20	59¼
16	Barley, Mensury.............	"	21	"	4	102	38	" ..	2	6-rowed...	18	10	47
17	Alsike........................	May	17	*		....	....	....	....	....	....	....	....
18	Pease.........................	"	4	*		....	....	....	....	....	....	....	....
19	Tares.........................	"	4	*		....	....	....	....	....	....	....	....
20	Red Clover....................	"	17	*		....	....	....	....	....	....	....	...
21	Alfalfa.......................	"	17	*		....	...	....	....	....	....	....	...
22	Summer-fallow.................	....		....		...	...	....	...	....	...	....	....

* Ploughed under.

CROP OF MIXED GRAIN.

A test was made of growing oats and pease together on a half-acre lot of fallowed land. Soil, clay loam. This was seeded on May 8, at the rate of 2 bushels of pease and ½ bushel oats per acre. It was cut August 20, and on being threshed, gave a yield of 1,718 lbs. grain per acre.

EXPERIMENT WITH FALL RYE.

Over half an acre of fallowed land was sown with fall rye on September 13, 1905. Ripe August 7. Straw 65 inches long including head, and of medium strength. Length of head, 5 inches. Yield per acre, 44 bushels. Weight per bushel, 58 lbs.

For several years winter rye has been sown each fall early in September, and has never failed to stand perfectly and give a good yield of straw and grain. For early spring fodder, either for pasture or cutting green, it surpasses all other grains so far tested.

EXPERIMENT WITH SPRING RYE.

One-twentieth acre of fallowed land was sown with spring rye on April 11. Ripe August 16; time to mature, 127 days. Straw strong, 45 inches long. Head 3¾ inches long. Weight of straw per acre, 2,500 lbs. Yield of grain per acre, 35 bushels, 20 lbs.; weight per bushel, 59 lbs.

EXPERIMENT WITH TARES.

Sown on one-twentieth acre plot of fallowed land, May 2. Ripe August 17; days to mature, 107. Straw strong, 40 inches long. Pod, 2 inches long. Yield per acre, 24 bushels 44 lbs., at 54 lbs. per bushel.

EXPERIMENT WITH CANARY GRASS.

(*Phalaris Canariensis*).

Sown on one-twentieth acre of fallowed land on May 8. Ripe August 15; time to mature, 99 days. Straw strong, length 34 inches. Heads 1½ inches long. Weight of straw, 3,820 lbs. per acre. Yield of grain, 37 bushels (of 48 lbs.) per acre.

EXPERIMENTS WITH MILLETS.

Five varieties of millet were sown May 9, but were completely destroyed by cutworms.

EXPERIMENT WITH HORSE BEANS.

Sown May 9, in rows 21, 28, 35 and 42 inches apart. Cut September 17.

	Height.	Green fodder. Yield per acre.	
Rows 21 inches apart........	36 inches.	11 tons	1,850 lbs.
" 28 "	36 "	8 "	550 "
" 35 "	36 "	8 "	480 "
" 42 "	36 "	7 "	1,070 "

EXPERIMENTS WITH SOJA BEANS.

Sown May 9, in rows 21, 28, 35 and 42 inches apart. Cut September 17.

	Height.	Green fodder. Yield per acre.	
Rows 21 inches apart........	30 inches.	4 tons	250 lbs.
" 28 "	30 "	3 "	900 "
" 35 "	30 "	2 "	950 "
" 42 "	30 "	2 "	110 "

EXPERIMENTS WITH FLAX.

The flax test was made on Western Rye Grass sod, broken in June of the preceding year. A considerable number of the plants in all the plots were destroyed by cutworms, but as soon as observed, the eaten spots were resown, and eventually the crop ripened before frost came.

Poisoned bran—1 lb. Paris green to 100 parts moistened bran—was scattered on the plots where the worms were working. This remedy, which is cheap and easily applied, stopped further loss.

FLAX—TEST OF VARIETIES.

Number.	Name of Variety.	Character of Soil.	Date of Sowing.		Date of Ripening.		Number of Days Maturing.	Length of Straw including Head.	Weight of Straw.	Yield per Acre.		Weight per Measured Bushel after Cleaning.
								Inches.		Bush.	Lbs.	Lbs.
1	Common.........	Clay loam.	May	9	Aug.	20	103	32	1,860	20	20	49½
2	Riga.............	"	"	9	"	18	101	27	2,480	17	48	55
3	Improved Russian.	"	"	9	"	20	103	30	1,820	16	44	57
4	White Flowering..	"	"	9	"	20	103	22	2,780	14	36	55
5	Yellow Seeded....	"	"	9	"	18	101	30	1,760	11	24	54½

FLAX—TEST OF SOWING DIFFERENT QUANTITIES OF SEED PER ACRE.

Quantity of Seed per Acre.											
20 lbs...............	....	May	8	Aug.	20	104	32	1,480	20	..	49¼
30 "	....	"	8	"	20	104	30	1,000	20	40	53½
40 "	....	"	8	"	20	104	32	1,680	18	52	50
50 "	....	"	8	"	20	104	30	1,660	17	28	49

ALFALFA TESTS.

In these tests it will be observed that Turkestan Alfalfa sown in 1904, stood two winters and gave over 1½ tons of hay in the two cuttings, while the Common variety sown at the same time was greatly injured.

Of the two plots of Common Alfalfa clover sown in 1905, one was so badly injured that it had to be cut over to check the weeds, while the other gave good returns.

In the spring of 1905, Alfalfa seed was sent by the Department of Agriculture, Washington, D.C., which had been secured from the following sources: Northern Montana, Southern Montana, Nebraska, Samarkand (Turkestan), New York, Peru, Minnesota (Grimm), Utah and First Quality Commercial Seed.

All the seed, as stated in my last report, germinated well, and made a good growth during the season. Early in April all the plots made a start, but by May four were quite dead, three were very uneven, and only one looked at all promising.

Early in July the clover on the four plots was cut. One gave a good yield, while the others had little or nothing except a promising crop of weeds. These plots were cut again in August with much better results.

HAY CROP.

Variety.	Year Sown.	Acres.	Yield per Acre.	
			Tons.	Lbs.
Western Rye Grass	1901..	2	2	1,400
" "	1905..	12	1	1,840
Awnless Brome Grass............................	1900..	5½	0	1,745
"	1900..	4½	0	1,100
"	*1899..	½	1	1,000
Timothy............................	1905..	½	1	1,500
Meadow............................	1904..	½	1	940

*Renewed by shallow ploughing in 1904.

Tests of Alfalfa.

Variety.	Year Sown.	First Cutting.			Second Cutting.		
		Date Cut.	Yield per Acre.		Date Cut.	Yield per Acre.	
			Tons.	Lbs.		Tons.	Lbs.
Turkestan	1904..	July 11..	0	1,800	Sept. 7 .	0	1,940
Common	1904..	" 11..	0	960	" 7..	0	1,020
"	1905..	" 11..	Cut for weeds.		Aug. 7..	0	1,370
"	1905..	" 4..	0	1,620	" 7..	1	756
Inoculated seed	1905..	" 4..	0	1,000	" 7..	1	112
Untreated seed	1905..	" 4..	0	1,430	" 7..	1	1,378
Received from Dept. of Agriculture, Washington—							
Minnesota (Grimm)	1905..	July 11..	2	180	Sept. 6..	1	930
New York	1905..	" 4 .	Cut for weeds.		Aug. 7..	1	500
Samarkand	1905..	" 4..	"		" 7..	1	560
Nebraska	1905..	" 4..	"		" 7..	1	450

EXPERIMENTS WITH INDIAN CORN.

Twenty-three varieties were sown on May 19, on backsetting, in rows 36 inches apart, and also in hills three feet apart each way. Three varieties were also sown in rows at four different distances apart. The corn was cut on September 13, the yield of green fodder per acre being computed from the weight of two rows, each 66 feet long.

Cutworms did considerable injury to the corn when coming above ground, but by applying poisoned bran along the rows, and re-seeding at once, no loss resulted in the end.

Corn—Test of Varieties.

Number.	Name of Variety.	Character of Soil.	Date of Sowing.	Height.	Condition when Cut.	Weight per Acre grown in Rows.		Weight per Acre grown in Hills.	
				Inches.		Tons.	Lbs.	Tons.	Lbs.
1	Eureka	Clay loam.	May 19..	80	Tasselled	16	1,000	17	980
2	Thoroughbred White Flint	"	" 19..	84	"	15	1,570	14	600
3	Pride of the North	"	" 19..	80	"	15	1,020	12	1,630
4	Angel of Midnight	"	" 19..	75	In silk	15	800	15	800
5	Champion White Pearl	"	" 19..	86	"	15	800	14	50
6	Early Mastodon	"	" 19..	85	"	14	1,920	13	1,500
7	Giant Prolific Ensilage	"	" 19..	80	Tasselled	14	1,700	14	1,150
8	Red Cob Ensilage	"	" 19..	92	"	14	1,150	14	1,370
9	Selected Leaming	"	" 19..	80	In silk	14	710	*8	1,490
10	Longfellow	"	" 19..	75	"	14	160	14	270
11	Evergreen Sugar	"	" 19..	75	Tasselled	14	50	14	160
12	Early Longfellow	"	" 19..	75	Early milk	14	50	13	1,500
13	North Dakota White	"	" 19..	75	"	13	1,500	14	1,150
14	Cloud's Early Yellow	"	" 19..	94	In silk	13	1,500	14	50
15	Early Butler	"	" 19..	90	"	13	620	13	1,500
16	Compton's Early	"	" 19..	82	Early milk	12	1,850	14	600
17	King Philip	"	" 19..	80	In silk	12	1,630	14	600
18	Early Leaming	"	" 19..	80	"	11	1,870	13	400
19	Salzer's All Gold	"	" 19 .	85	"	11	1,650	13	400
20	White Cap Yellow Dent	"	" 19..	90	Early milk	11	550	11	1,100
21	Superior Fodder	"	" 19..	75	Tasselled.	11	..	13	1,500
22	Mammoth Cuban	"	" 19..	80	In silk	11	..	11	1,870
23	Wood's Northern Dent	"	" 19..	82	"	10	1,240	11	1,760

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* This was the outside row.

INDIAN CORN.—TEST OF SEEDING AT DIFFERENT DISTANCES.

Sown in rows by grain seeder May 21; cut September 13; cultivation of land same as for preceding test.

Name of Variety.	Distance between Rows.	Height.	Weight per Acre grown in Rows.	
	Inches.	Inches.	Tons.	Lbs.
Longfellow	21	65	16	1,950
"	28	70	14	1,290
"	35	70	14	1,210
"	42	75	14	760
Champion White Pearl	21	75	20	1,120
" "	28	75	16	1,540
" "	35	80	18	1,110
" "	42	80	13	400
Selected Leaming	21	80	14	1,800
"	28	80	19	1,680
"	35	80	13	1,170
"	42	80	9	860

ROOT CROPS.

The roots of all sorts were sown on land that was in Western Rye Grass the preceding years. This had been ploughed in June, 1905, and again in the fall, and after frost set in it was manured with from 10 to 12 loads of rotted manure to the acre. In May the manure was ploughed in with gang ploughs, about three inches deep, harrowed, and the seeds sown.

Excepting the carrots, a good catch was secured of all the varieties sown. Unfortunately a very heavy rain came on, soaking the soil so much that it was impossible to attend to the cutworms, which were working in all parts of the field. With the exception of two small plots, the entire first seeding of carrots, turnips, mangels and sugar beets was destroyed. Many plants in the second seeding were also destroyed, and had to be sown for the third time.

The yields of roots were computed from the weight of two rows, each 66 feet long, and 30 inches apart.

TURNIPS.—TEST OF VARIETIES.

Twenty varieties were sown on May 11 and 18 and June 14. The first two seedings were destroyed by cutworms. The crop from the third seeding was pulled on October 10, and the yield is given below.

Name of Variety.	Character of Soil.	Yield per Acre.			
		2nd Plot.			
		Tons.	Lbs.	Bush.	Lbs.
Hartley's Bronze	Clay loam	22	1,408	756	48
Perfection	"	21	900	715	..
Bangholm Selected	"	21	636	710	36
Hall's Westbury	"	20	1,052	684	12
Magnum Bonum	"	19	1,864	668	48
Mammoth Clyde	"	17	320	572	..
Imperial Swede	"	16	1,924	565	24
Elephant's Master	"	16	1,924	565	24
Carter's Elephant	"	16	1,660	561	..
Good Luck	"	16	1,396	556	36
Kangaroo	"	16	472	541	12
Halewood's Bronze Top	"	16	208	536	48
Skirving's	"	16	208	536	48
New Century	"	15	1,944	532	24
East Lothian	"	15	1,020	517	..
Selected Purple Top	"	15	756	512	36
Sutton's Champion	"	15	228	503	48
Dickson's Emperor	"	14	1,172	486	12
Drummond Purple Top	"	13	1,984	466	24
Jumbo	"	13	1,588	459	48

MANGELS—TEST OF VARIETIES.

Fifteen varieties were sown on May 11 and 19 and June 13. The first seeding was destroyed by cutworms. Crop from other two seedings was pulled on October 8.

Name of Variety.	Character of Soil.	Yield per Acre.							
		2nd Plot.				3rd Plot.			
		Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
Triumph Yellow Globe	Clay loam	22	748	745	48	28	232	937	12
Yellow Globe Selected	"	21	1,428	723	48	22	1,804	763	24
Lion Yellow Intermediate	"	21	108	701	48	21	636	710	36
Prize-winner Yellow Globe	"	20	524	675	24	27	252	904	12
Yellow Intermediate	"	19	1,996	666	36	23	728	778	48
Half Sugar White	"	18	1,488	624	48	23	596	776	36
Giant Yellow Globe	"	18	1,356	622	36	24	180	803	..
Giant Yellow Intermediate	"	18	960	616	..	24	972	816	12
Giant Sugar	"	18	696	611	36	20	1,844	697	24
Leviathan Long Red	"	18	168	602	48	21	636	710	36
Prize Mammoth Long Red	"	18	36	600	36	19	544	679	24
Half Sugar Rosy	"	17	1,772	596	12	21	1,296	699	36
Mammoth Long Red	"	17	584	576	24	21	900	715	..
Gate Post	"	17	56	567	36	18	1,092	618	12
Selected Mammoth Long Red	"	13	1,456	457	36	19	1,336	655	36

SUGAR BEETS—TEST OF VARIETIES.

Sown May 11 and 18 and June 13. First two seedings destroyed by cutworms. Crop from last seeding taken up on October 9.

Name of Variety.	Character of Soil.	Yield per Acre.			
		Tons.	Lbs.	Bush.	Lbs.
Royal Giant	Clay loam	19	148	635	48
Danish Red Top	"	16	1,000	550	..
Danish Improved	"	16	472	541	12
Improved Imperial	"	15	888	514	48
Red Top Sugar	"	14	1,568	492	48
Wanzleben	"	11	308	371	48
Vilmorin's Improved	"	10	856	347	36
French Very Rich	"	9	480	308	..

EXPERIMENTS WITH POTATOES.

Thirty-two varieties have been under trial during the past year. They were all planted on May 12, in clay loam, in rows two and a half feet apart, with the sets about a foot apart in the rows. They were all dug on October 3 and the yield per acre has been calculated from the weight of crop obtained from two rows each 66 feet long. There was no rot this year.

POTATOES—TEST OF VARIETIES.

No.	Name of Variety.	Average Size.	Yield per Acre.						Form and Colour.
			Total.		Marketable.		Un-marketable		
			Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	
1	Money Maker	Large	433	24	415	48	17	36	Oval, white.
2	Dalmeny Beauty	"	406	30	406	30	...	......	Oval, white.
3	Carman No. 3	"	402	36	391	36	11	..	Oval, white.
4	Country Gentleman	"	387	12	365	12	22	..	Oval, pink.
5	Canadian Beauty	"	380	36	363	..	17	36	Long, pink.
6	Ashleaf Kidney	"	371	20	371	20		....	Long, white.
7	Vick's Extra Early	Medium	369	36	352	..	17	36	Oval, pink.
8	Sabean's Elephant	Large	367	24	352	..	15	24	Long, white.
9	Late Puritan	Medium	360	48	360	48	......	..	Oval, white.
10	Vermont Gold Coin	Large	360	48	360	48	......	....	Oval, white.
11	Dreer's Standard	"	358	36	330	..	28	36	Round, white.
12	State of Maine	"	352	..	336	36	15	24	Oval, white.
13	Empire State	"	347	36	310	12	37	24	Oval, white.
14	Burnaby Mammoth	"	345	24	332	12	13	12	Long, red.
15	I. X. L.	Medium	334	24	321	12	13	12	Long, pink.
16	American Wonder	"	332	12	321	12	11	..	Oval, white.
17	Irish Cobbler	Large	332	12	319	..	13	12	Round, white.
18	Rochester Rose	"	332	12	327	48	4	24	Long, red.
19	Maule's Thoro'bred	Medium	323	24	305	48	17	36	Oval, red.
20	Reeve's Rose	"	321	12	297	..	24	12	Oval, red.
21	Early Envoy	"	321	12	294	48	26	24	Oval, red.
22	Pearce	Large	316	48	305	48	11	..	Oval, red.
23	Everett	Medium	308	..	290	24	17	36	Long, pink.
24	Early White Prize	"	305	48	305	48	....		Oval, white.
25	Uncle Sam	Large	299	12	292	36	6	36	Oval, white.
26	Early Rose	Medium	294	48	255	12	39	36	Oval, red.
27	Holborn Abundance	"	292	36	275	..	17	36	Oval, white.
28	Morgan's Seedling	Large	290	24	272	48	17	36	Long, red.
29	Dooley	"	277	12	270	36	6	36	Oval, white.
30	Bovee	Medium	259	36	242	..	17	36	Oval, pink.
31	Carman No. 1	Large	228	48	217	48	11	..	Oval, white.
32	Pingree	Medium	224	24	224	24	.....	......	Oval, white.

SUMMARY OF CROPS, 1906.

	Bush.	Lbs.
Wheat:		
9 varieties, 45½ acres	1,389	
10 half acres, rotation test	89	
39 uniform test plots	70	
	1,548	
Oats:		
11 varieties, 49 acres	3,712	
3 half acre plots, rotation test	70	
43 uniform test plots	202	
	3,984	
Barley:		
9 varieties, 38 acres	1,585	
3 half acres, rotation test	29	
36 uniform test plots	71	
	1,685	
Pease:		
3 varieties, 4 acres	157	
32 uniform test plots	60	
	217	
Flax	7	
Rye	30	
Roots	4,000	
Potatoes	130	
Emmer and Spelt	..	2,000
	Tons.	
Corn ensilage	85	
Hay:		
Rye Grass	25	800
Brome Grass	14	1,500
Sundry grasses	1	1,080
Alfalfa	5	1,630
Hay cut in coulees	28	
	75	1,010

VEGETABLE GARDEN.

All vegetables gave a satisfactory crop. The spring and summer were favourable to all tender plants, such as beans, cucumbers, tomatoes, &c. Cutworms did some injury, but when noticed, the poisoned bran, used for the grain and root crop, proved an effectual remedy.

ASPARAGUS.

A good crop from the old beds of Barr's Mammoth, Barr's Elmira and Conover's Colossal. In use May 12 to July 6.

BEANS.

Sown June 2.

Variety.	Seed from.	In use.	Remarks.
German Golden Pole	Steele, Briggs	August 14	Long wax, good crop.
White Wax	"	" 1	Heavy crop, good quality.
New Round Pod	Rennie	" 5	Wax, light crop.
Kidney Wax	"	" 1	Heavy crop, good, large.
Golden Wax	"	" 1	Fair crop, fine quality.
Emperor of Russia	Ottawa	" 3	Green, short.
Fame of Vitry	"	" 3	Long green, good crop.
Dwarf Wax	Vilmorin	" 4	Round pods, fair.
Extra Early	"	" 1	Green, very heavy crop.
Matchless	"	" 6	Green, good crop.
Golden Stringless	"	" 2	Wax, short.
Black Speckled	"	" 8	Green, fair crop.
Black Speckled	Indian Head	July 28	Green, light crop.
Currie's Rust-proof	"	" 31	Wax, long pods.
Challenge Black	"	" 28	Wax, short.
Dwarf Kidney	"	" 24	Wax, fair crop.
Emperor of Russia	"	" 26	Green, fair crop.
Extra Early	"	" 25	Green, good crop.
Early Six Weeks	"	" 23	Green, fair.
Golden Stringless	"	" 30	Short, fair crop.
Haricot Matchless	"	" 23	Good crop.
Galatian	George Fernie	August 4	Short green, fair crop.

BEETS.

Sown April 20; pulled October 1.

Variety.	Seed Obtained from.	In use.	Yield per Acre.
			Bushels.
Cardinal	Rennie	July 12	654
Intermediate	"	" 15	543
Eclipse	"	" 15	523
Crimson Globe	Steele, Briggs	" 12	497
Downing Blood Turnip	"	" 15	445
Extra Early Egyptian	"	" 12	419
Long Blood Red	Vilmorin	" 31	399
Early Blood Red	"	" 7	307
Egyptian	"	" 12	301
Nutting's Dwarf Imported	"	" 15	268
* Spinach Beet	Rennie		Good yield; not weighed.

* This variety is used in the same way as Spinach.

BROCCOLI.

Extra Early White. Seed from Vilmorin; sown April 11; set out May 22. Fair quality.

BRUSSELS SPROUTS.

Dwarf Improved. Seed from Vilmorin; sown April 11; set out May 22; in use August 30. Small sprouts, good quality.

CABBAGE.

Sown in hot-house April 2; set out May 22. Taken up October 12.

Variety.	Seed from.	In use.	Average Weight.	Remarks.
			Lbs.	
Paris Market	Vilmorin	July 20	10	Fair.
Express	"	" 20	4½	"
Midsummer Savoy	"	" 26	4½	Rather loose.
Winningstadt	"	Aug. 2	7	Very fine.
Jersey Wakefield	"	July 16	5	Fair, solid.
Flat Dutch Drumhead	"	Aug. 20	8	Good.
Fottler's Improved	"	" 20	7½	"
Green Globe Savoy	"	" 15	4	"
Early Etampes	Steele, Briggs	" 28	5½	Very good.
" Winningstadt	"	" 24	8	Good.
" Summer	"	" 20	7	Large, flat, solid.
Vandergaw	"	" 18	12	Very good.
Early Favourite	"			Did not germinate.
Chester Savoy	"	Aug. 12	5	Fair.
Autumn King	"	" 20	9½	Good.
Large Drumhead	"	" 20	11	Very fine.
Dark Red Early Dutch	"	" 6	4	Fair.
Red Drumhead	"		7½	Very good.

CARROTS.

Sown April 18; pulled October 8.

Variety.	Seed from.	In use.	Yield per Acre.
			Bushels.
Half-long Luc	Steele, Briggs	July 12	528
Ox Heart	"	" 12	495
Early Gem	Vilmorin	" 12	495
Half-long Danvers	Steele, Briggs	" 12	468
Market Garden	Rennie	" 12	396
Chantenay	"	" 6	382
Half-long Scarlet Nantes	Steele, Briggs	" 12	336
Long Blood Red	Vilmorin	" 24	336
French Horn	"	" 4	191

Cauliflowers.

Sown in hot-house April 2; set out May 22.

Variety.	Seed from.	In use.	Average Weight.	Remarks.
			Lbs.	
Early Snowball	Steele, Briggs	July 7	2½	Very fair.
Early Paris	"	" 7	2½	"
Extra Early Whitehead	"	" 15	3½	Good heads.
Autumn Giant	"	Aug. 12	3½	Fair.
Dwarf Erfurt	Rennie	" 9	2½	"
Autumn Giant	"	" 15	3½	"
Early Snowball	"	July 7	3	Good.
Extra Early Erfurt	"	" 9	2½	Fair.
Early Paris	"	" 15	2½	"
Early Snowball	Vilmorin	" 7	4½	Very fine.
Extra Selected Earliest Erfurt	"	" 7	4½	"
Early Paris	"	" 15	3	Good heads.

Celery.

Variety.	Seed from.	Sown in Hot-house.	Trans-planted.	Set out.
Giant Pascal	Steele, Briggs	April 2	May 7	June 2
Dwarf White	" "	" 2	" 7	" 2
Evans' Triumph	" "	" 2	" 7	" 2
Paris Golden	Rennie	" 10	" 7	" 2
Giant White	"	" 10	" 7	" 2
White Plume	"	" 10	" 7	" 2
Paris Golden Yellow	Vilmorin	" 2	" 7	" 2
Giant Pascal	"	" 2	" 7	" 2
Rose-ribbed Paris	"	" 2	" 7	" 2

Crop of good quality. White Plume in use August 25; other sorts in use about September 5.

Citrons.

Preserving Citron, seed from Rennie, sown in hot-house April 13; set out May 17. A good crop; average circumference, 19 inches.

Corn.

Sown May 21.

Variety.	Seed from.	In use.	Ripe.
New Premo	Steele, Briggs	Aug. 28	Did not mature.
First of All	" "	" 26	" "
Early Windsor	Rennie	" 24	" "
Red Squaw	Indian Head	" 9	Sept. 13.
White Squaw	"	" 9	" 13.
White Squaw	Swan River	" 9	Did not mature.
Early Regina	Thorndike	" 20	" "
Golden Bantam	"	" 31	" "
Cross-bred from Sifton		" 30	Sept. 13. Only a little ripened.

CUCUMBERS.

Sown in hot-house April 13; set out May 17.

Variety.	Seed from.	In use.	Ripe.	Length.	Remarks.
				In.	
Improved Long Green	Steele, Briggs	July 20	Aug. 15	10	Fair crop.
Short Green	" "	" 18	" 15	8	Good crop.
White Spine	" "	" 18	" 20	6	" "
Giant Pera	" "	" 8	" 12	8	" "
Perfection	Rennie	" 20	" 15	8	Fair crop.
Chicago Pickling	"	" 12	" 10	6	" "

LETTUCE.

First sowing April 19; in use June 5. Second sowing May 17; in use July 1. Third sowing June 2; in use July 18.

Variety.	Seed from.	Remarks.
Cos, Trianon	Vilmorin	Good crop.
" Green Paris	"	"
Cabbage, Trocadero	"	Fair.
" Blonde Stonehead	"	Very fine.
" Red-edged Victoria	"	Ran to seed three weeks before other varieties.
" All the Year Round	"	Fair.
" Neapolitan	"	Fine solid heads.
" Wheeler's Tom Thumb	"	Small, extra solid.

MELONS.

Sown April 2; set out May 17.

Variety.	Seed from.	Circumference.	Remarks.
		Inches.	
Musk, Earliest of All	Rennie	15	Good crop.
" Early Hackensack	"	10	"
Water: Early Canada	"	..	Did not nature.
Cole's Early	"	19	Good crop.

Melons were not ripe when frost came on September 11, but ripened under cover, after being pulled.

ONIONS.

Sown in open April 18.

Variety.	Seed from.	Yield per Acre.
		Bushels.
Extra Early Red	Rennie	58
Australian Brown	"	51
Giant Gibraltar	"	72
Prize Taker	"	115
Red Wethersfield	"	36
Red Globe	"	112
Yellow Globe Danvers	"	39
White Barletta	"	58

Sown in hot-house April 2; set out April 23.

Silverskin	Vilmorin	36
Market Favorite	"	43
Trebon's	"	120
Yellow Globe Danvers	"	51
Silver Giant	Rennie	39

ONION SETS.

Planted April 29.

New White Multiplier	Steele, Briggs	31
Shallots	"	31

PARSLEY.

Moss-curled, from Rennie, sown May 10; in use June 29. Good crop.

PARSNIPS.

Sown April 19.

Variety.	Seed from.	In use.	Yield per Acre.
			Bushels.
Short Round	Steele, Briggs	Aug. 15	430
Student	"	" 25	355
New Intermediate	"	" 25	215
Guernsey	"	" 25	154

PEASE.

Extra Early, First of All, First and Best, Nott's Excelsior, Rural New Yorker, Surprise and Wm. Hurst were sown April 23, and were in use July 10. The following varieties were sown on May 9.

Variety.	Seed from.	In use.	Ripe.	Remarks.
New Dwarf Telephone	Rennie	July 28	Aug. 12	Very heavy crop.
Sutton's Excelsior	"	" 28	" 5	Good crop.
Perfection	"	" 30	" 12	Heavy crop.
Queen	"	Aug. 4	" 20	Light crop.
Admiral	Indian Head	July 21	" 2	Good crop.
Alaska	"	" 18	July 31	
American Wonder	"	" 24	Aug. 10	Fair.
Anticipation	"	" 31	" 10	Fair crop.
Burpee's Profusion	"	" 28	" 9	Large crop.
Champion of England	"	" 28	" 10	Good crop.
Extra Early	"	" 16	July 30	Fair crop.
Everbearing	"	" 28	Aug. 6	Good crop.
First of All	"	" 16	July 30	"
First and Best	"	" 21	" 31	"
Harrison's Glory	"	" 27	Aug. 14	"
Horsford's Market Garden	"	" 26	" 8	Fair crop.
Laxton's Charmer	"	" 27	" 8	"
Nott's Excelsior	"	" 21	" 1	Very good quality.
Premium Gem	"	" 27	" 9	Fair.
Rural New Yorker	"	" 20	" 1	Good crop.
Surprise	"	" 23	July 30	Good early pea.
Stratagem	"	" 30	Aug. 9	Very large, good crop.
Shropshire Hero	"	" 26	" 5	Fair.
Yorkshire Hero	"	" 24	" 9	Large, fine quality.
Wm. Hurst	"	" 21	" 1	Very good.

RADISH.

Variety.	Seed from.	Sown April 18. In use.	Sown May 17. In use.	Sown June 4. In use.
Forcing Turnip	Vilmorin	June 2	June 18	*
Early Scarlet Turnip	"	" 2	*	June 29
Early Scarlet White-tipped	"	" 2	*	" 29
Earliest Scarlet Forcing	"	" 2	June 18	" 29
Olive Shaped	"	" 5	*	" 29
French Breakfast	"	" 5	June 18	*

* Not sown.

RHUBARB.

Old beds in use May 12. Following is list of the varieties.

Victoria,
Prince Albert,
Royal Albert,
Prince of Wales,
Royal Linnæus,
Magnum Bonum,
Strawberry,
Early Crimson,
Early Scarlet,
Toblesk,
Myatt's Linnæus,
Fottler's Improved,
Scarlet Nonpareil,
Salt's Perfection,
Monarch,
Brabant's Colossal,

SAGE AND SUMMER SAVORY.

Sown May 10; in use July 6. A good crop of each.

SPINACH.

Victoria, sown May 10; in use June 25. Good crop.
Round, ″ 10; ″ 25.

SQUASH AND MARROWS.

Sown in hot-house April 16; set out May 17.

Variety.	Ripe.	Remarks.
Squash—		
Crookneck	Aug. 10	Good crop; average length 10 inches.
Early White Scallop		Did not mature.
Marrow—		
Boston	Aug. 2	Good crop; 2½ feet circumference.
Early White	July 30	Good crop; average 12 inches long.

TOMATOES.

Sown in hot-house April 10; set out May 22. The yield is given from 20 plants, set 2½ by 3 feet.

Variety.	Seed from.	In flower.	First ripe.	Yield from 20 plants.
				Bushels.
First of All	Rennie	July 1	Aug. 19	1¼
Earliana	″	″ 1	″ 16	1¾
Cherry Red	″	June 24	″ 19	1
Hustler	″	″ 18	″ 22	1½
Early Tree	Anamoose, N.D.	″ 18	″ 20	1
*Earliana	″			

* Did not germinate.

Frames with glass covers were placed about some of the plants before frost came in September, thus saving the fruit from injury and hastening its ripening.

TABLE TURNIPS.

Sown May 21.

Variety.	Seed from.	In use.	Pulled.	Yield per Acre.
				Bushels.
Yellow Golden Ball	Vilmorin	July 25	Oct. 11	550
Early Stone	″	″ 25	″ 11	483
Early White Strap-leaf	″	″ 25	″ 11	430
White Milan	″	″ 22	″ 11	390
Dickson's Abundance	J. Watson	Aug. 25	″ 11	256

THE FLOWER GARDEN.

The Annuals were not so successful as in many former seasons. The dry, hot weather in July, and again in August was against them. The Perennials, especially Pæonies, were never more beautiful.

ANNUALS—Propagated in hot-house. Sown April 2 and 3.

Variety.	Set out.	In Bloom.		Remarks.
		From.	To.	
Abronia umbellata	June 1	July 26		
Ageratum, Dwarf Imp'l Blue	" 1	" 8		
Agrostemma	" 3			
Alyssum	" 1	May 20	Oct. 9	Good border. Bloomed before setting out.
Amaranthus salicifolius	" 2	July 28		Very handsome.
Antirrhinum, Tom Thumb	" 2	" 12	Oct. 9	Good border.
" Majus nanum	" 2	" 8		
Arctotis grandis	" 2			Woolly leaf, pretty.
Asters, 7 varieties	May 23	Aug. 1		
Balsam, Camelia-flowered	" 31	July 8		Very fine.
Bartonia aurea	June 2	June 16		Bloomed freely.
Brachycome iberidifolia	" 2	July 16	Oct. 9	Bloomed well.
Calendula officinalis Trianon	" 1	June 24	" 9	Did well.
Candytuft, Empress	" 2	" 14	" 9	Good.
Celosia, 4 varieties	" 2	" 26		Very fine.
Centaurea alba	" 1	July 6		Bloomed freely.
Chrysanthemum coronarium	May 18	June 25	Oct. 6	Profusion of bloom.
" dwarf double white	" 18	" 25	" 6	" "
Clarkia, 3 varieties	June 1	" 24		Did well.
Coleus	" 1			Eaten by cutworms.
Coreopsis	" 2	July 1		Bloomed freely.
Dianthus, 7 varieties	" 1	" 8	Oct. 9	Fair.
Eschscholtzia	" 1	" 1	" 9	Better sown in open.
Gaillardia	" 2	" 8	Sept. 29	Very fine.
Godetia	" 1		Oct. 2	Grand show.
Gourd, Hercules Club	" 4			Gourds 18-in. long.
Gypsophila elegans	" 2	June 10	Oct. 9	Small white flower.
Helichrysum	" 2	July 7	" 2	Did well.
Hemp	May 18	" 20		8-ft. high.
Iberis Gibraltarica	June 1	" 31		Fair.
Ice Plant	" 1	Aug. 12	Oct. 9	Very good.
Larkspur	May 25	June 29	Sept. 29	Very fine.
Lavatera rosea splendens	" 25	" 29	" 25	Great show of bloom.
Lobelia	June 2	" 27	" 29	Very pretty.
Marvel of Peru	" 2	July 20	" 29	Bloomed well.
Mignonette	" 2	June 20	Oct. 9	Good.
Nasturtium, 5 varieties	May 31	" 14	Sept. 29	Did very well.
Nicotiana affinis	June 1	July 5	" 29	Very fine, white.
" Sanderae	" 1	" 20	" 29	Very handsome, crimson.
Petunia, 4 varieties	May 31	" 2	" 29	Extra fine.
Phacelia grandiflora	" 2	" 24	" 29	Bloomed well.
Phlox Drummondii, 4 varieties	June 1	" 4	Oct. 9	Rather poor.
Poppy, 8 varieties	" 1	June 26		Injured by cutworms.
Portulaca				Did not germinate.
Pyrethrum	June 1	July 18		Fair.
Salpiglossis	" 2	" 8		Very handsome.
Scabiosa, 3 varieties	" 2	" 24	Sept. 29	Did well.
Scarlet Flax	" 2	" 8	Oct. 9	Very pretty.
Stocks	May 25	June 22	" 9	Did well.
Tagetes	June 1	" 22	Sept. 29	Very good.
Verbena	May 25	July 8	Oct. 9	Splendid show.
Zinnia	June 1	June 25		Fair.

ANNUALS—Sown in open.

The following annuals were sown in the open on the dates shown. In most cases they did as well as those started in hot-house, but were somewhat later in commencing to bloom. Dianthus (Pinks) and Eschscholtzia, were better sown in open than in hot-house.

Variety.	Sown.	Variety.	Sown.
Ageratum	April 22	Ice plant	May 11.
Alyssum	May 11.	Lobelia	" 11.
Amaranthus	" 11.	Mignonette	April 23.
Antirrhinum	" 11.	Nasturtium	May 11.
Brachycome iberidifolia	" 11.	Phacelia	" 11.
Candytuft	April 23.	Phlox Drummondii	" 11.
Celosia	May 11.	Poppy	" 11.
Centaurea alba	" 11.	Salpiglossis	" 11.
Chrysanthemum	" 11.	Scabiosa	" 11.
Clarkia	" 11.	Scarlet Flax	" 11.
Dianthus	" 11.	Sweet Pease, 28 varieties	April 22.
Eschscholtzia	April 23.	Sweet Pease, dwarf Cupid	" 22.
Gaillardia	May 11.	Tagetes, Patula dwarf	May 11.
Godetia	" 11.	Zea, Japonica variety	June 5.

PERENNIALS.

Carnations were sown in hot-house April 2; set out May 25; bloomed from August 17 to October 1.

Hollyhocks—sown in hot-house April 3; set out May 25; bloomed from August 12 to September 29. Did very well.

Pansies, 10 varieties—sown in hot-house April 2; came up rather poorly. Set out May 25; bloomed from June 19 till November.

Violets (English White and Blue), were sown in hot-house April 3, but did not germinate.

CANNAS.

The following Canna roots were sent from the Central Experimental Farm, Ottawa, and planted in hot-house May 8. They were set out in garden June 18; in bloom August 6.

R. Pearson,
Queen Charlotte,
Pennsylvania,
Rubin,
America,
Allemania.

DAHLIAS.

Planted in hot-house May 12; set out June 16; in bloom July 18. Following are the varieties:—

Cochineal,
Snowflake,
Kynerith,
Mrs. Chas. Turner,
Cannell's Gem,
Wm. Pearce,
Lady H. Grosvenor,
Cactus Queen,
Nymphaea,
Prince of Orange,
Ernest Glasse,
Prince Imperial,
Wm. Agnew,
Empress of India,
Capstan,
Clifford Bruton.

BULBS.

In October, 1905, a large collection of bulbs were sent from the Central Experimental Farm, Ottawa, and were set out before the ground froze. The list comprised Tulips, Narcissus, Crocus, Snowdrops, Siberian Squills and Glory of the Snow (Chionodoxa). These gave a fine succession of bloom in the early part of the season, the Tulips doing the best.

PERENNIALS.

The following perennials were sent from the Central Experimental Farm, Ottawa, on April 12, 1906, and were planted out in the garden. The majority of them made weak growth, but such of them as survive the winter will likely make better progress in 1907.

Aconitum Napellus bicolor,
Barbarea vulgaris fl. pl.,
Centaurea ruthenica,
Cimicifuga racemosa,
Campanula macrantha,
Campanula persicifolia,
Delphinium Cashmerianum,
Delphinium Cashmerianum album,
Delphinium Belladonna,
Epimedium Muschianum,
Iberis corifolia,
Œnothera fruticosa,
Œnothera Youngii,
Papaver Orientalis Duke of Teck,
Papaver Orientalis Mahony,
Papaver Orientalis Salmon Queen,
Polemonium Richardsoni,
Ranunculus aconitifolius fl. pl.,
Spiraea aruncus,
Spiraea filipendula fl. pl.,
Trollius Japonica plena,
Adonis vernalis,
Adenophora Polamina,
Erica vagans alba,

and 23 varieties of Primula Sieboldi.

Dates of Blooming of Sundry Perennials, planted prior to 1906.

Snowdrops, April 16.
Squills, April 19.
Crocus, Yellow, April 24.
Crocus, Purple, April 29.
Crocus, White, May 10.
Chionodoxa luciliae, May 8.
Tulips, May 9.
Narcissus, May 18.
Pansies, April 22.
Viola, May 12.
Irises, May 31.
Everlasting Pea, June 3
Columbine, June 3.
Pæonies, June 20.
Pæonia tenuifolia, June 4.
Centaurea, June 13.
Grass Pink, June 13.
Hemerocallis, June 18.
Dielytra, June 24.
Lychnis, June 26.
Spiraea filipendula, June 27.
Sweet William, June 27.
Lupinus, July 1.
Achillaea, July 1.
Clematis recta, July 1.
Lilium, July 2.
Œnothera fruticosa, July 5.
Epimedium muschianum, July 17.
Delphinium, July 8.
Campanula Macrantha, June 30.
Veronica, July 15.
Helianthus, July 22.
Platycodon album, July 30.
Hollyhock, August 2.

TREES AND SHRUBS.

THE ARBORETUM.

The varieties of trees and shrubs under observation made a good growth during the season. Those added in the spring of 1905, referred to in my report for that year, made a strong growth, with the following exceptions, which were winter-killed:—Viburnum lentago, Acer dasycarpum (seed from Winnipeg), Austrian Pine and Red Pine.

Last spring (1906) a number of specially hardy Rose trees were sent from the Central Experimental Farm, Ottawa, and set out in the Arboretum. These, with one exception—Frau Karl Drushki,—did very well, making strong growth, and in most cases blooming till late in the season.

There were two each of the following varieties:—

Souv. de Philemon Cochet,
Mercedes,
Copper Austrian,
Delicata,
Mrs. Anthony Waterer,
Rugosa Alba,
Yellow Capucine,
Belle Poitevine,
Persian Yellow,
Heterophylla,
Calocarpa,
Roseraie de l'Hay,
Frau Karl Drushki,
Madame Plantier,

Five hundred plants of Sea Buckthorn were received from the Central Experimental Farm, and planted for a hedge, and from the South Dakota Experiment Station at Brookings, were sent 300 plants of Siberian Sandthorn, and 100 cuttings of Niobe Willow.

TREE SEEDS.

Owing to frost killing the blossoms last spring, no seeds of the Native Maple matured in 1906, and the usual distribution of these seeds cannot be made in 1907.

As it is hoped that the 1907 crop will be good, providing a supply for the distribution of 1908, instructions for planting are repeated from my last report.

PLANTING TREE SEEDS.

Many inquiries are made during the year as to the best way to grow tree seeds in the Northwest, where usually at the time they are sown, the soil is very dry. For several seasons, little or no trouble has been experienced from this cause on the Experimental Farm, while in some districts the weather has been very dry.

Maple seeds can be sown late in October, or early in May. It is not safe to sow all the supply of maple seed in the fall, as very often germination takes place too early in the spring, and frost kills the entire crop.

Ash seed should be sown in October. Elm seed should be sown as soon as gathered in June, though it sometimes succeeds if sown the following spring.

Elm seed requires a very light covering of fine moist soil, not over $\frac{1}{2}$-inch in thickness, while maple and ash should be covered 1 or $1\frac{1}{2}$ inches.

Tree and shrub seeds should be sown in rows about 30 inches apart to permit horse cultivation when considerable quantities are grown. In all cases the land should be prepared the year preceding sowing, so as to have the soil as fine as possible. Breaking and backsetting new land, and summer-fallowing old, make the best and safest preparation.

Trees should be transplanted when seedlings are 2 years old. When left until 3 or 4 years old, the trouble and expense are greatly increased.

FRUIT TREES.

PLANTING.

Last spring the Central Experimental Farm sent up a number of Russian Seedling Apples, which were planted in Orchard No. 7, also over 200 Seedlings of Cross-bred Apples, which were set out in a new orchard east of the barn. 2 trees each of Golden and Silvia, cross-bred apples were also received.

A list is given of the varieties comprised in the above mentioned lots.

Russian Seedlings.

1 Carman.
1 Snelling.
1 Arcola.
1 Solina.
1 Selkirk.
1 Ponoka.
1 Ramona.
1 Souris.
1 Sanford.
1 Wesley.
1 Bolton.
1 Pingree.
1 Birtle.
1 Grenfell.
1 Bowie.
1 Hanley.
1 Morden.
1 Rupert.
1 Roslin.
1 Morley.
1 Lang.
1 Virden.
1 Excelsior Crab.
1 Simbirsk No. 9.

Seedlings of Cross-bred Apples.

7	Seedlings of	No. 449.	20	Seedlings of	Romney.
20	"	Golden.	6	"	Dawn.
15	"	Columbia.	12	"	Silvia.
12	"	Madge.	25	"	Jewel.
8	"	Elsa.	25	"	Alberta.
22	"	Banks.	25	"	Tony.
12	"	Lizzie.	5	"	Robin.

PLUMS.

Five trees of Aitkin Plum were received from the Central Experimental Farm, and planted out.

STRAWBERRIES.

The South Dakota Experiment Station, Brookings, S.D., kindly sent 50 plants of S. D. No. 1 Strawberry (seedling of Jessie, fertilized with pollen of Manitoba Wild Strawberry), which were set out near those they sent in 1905.

One hundred plants of Dunlap Strawberry were received from Mr. W. H. Fairfield, Lethbridge, Alta., and planted.

FRUIT CROP.

SIBERIAN CRAB APPLES (*P. baccata*).

There was a medium crop of this fruit, the quality being good, except for the fact that some of the crabs had been brused slightly by hailstones in the storm of July 24.

CROSS-BRED APPLES.

A good many of these varieties fruited for the first time in 1906. The fruit was in general somewhat smaller than that of the same varieties grown at Ottawa, but this may perhaps be accounted for by the very dry weather during August, at the time the fruit was filling.

Derby, Northern Queen, and seedlings of Pauline, Dean and Aurora, bore fruit of fair size, and of quality much superior to the Pyrus baccata.

PLUMS.

The Manitoba Native plums yielded a good crop, which would have been heavier had not the hailstorm of July 24 knocked off a large number of the fruits. As there was no killing frost till well on in September, almost the whole crop ripened.

RASPBERRIES.

The crop of raspberries was, as usual, good. The best varieties now under test are Turner, Miller, Marlboro, Dr. Reider, Caroline and Garfield.

CURRANTS.

The currant crop was a complete failure owing to the attack of the Currant Maggot (Epochra canadensis). Almost every berry was infested by one of the pests.

GOOSEBERRIES.

The crop of Gooseberries was light, but some of the fruit was quite large. Smith's Improved and Houghton are the varieties longest under test. Young plants of a number of cross-bred sorts made vigorous growth, and the following varieties fruited lightly:—Pale Red, Red Jacket, Rideau, Edna, Mabel and Gibb.

STRAWBERRIES.

The Strawberry crop, while light, was of good quality, and worthy of note as the tests of this fruit have met with such poor success in most previous years.

The varieties fruiting were:—Grenville, Enhance, Crescent, Daisy, Johnson's Early, Bisel, Daniel Boone, Williams, 3 varieties of Alpine Strawberry (Jean d'Arc, St. Joseph and St. Antoine de Parker) and S. D. No. 1.

CATTLE.

The herd at present consists of 19 pure-bred Shorthorn cows, 3 bulls, and 19 grade animals.

In December, 1906, the whole herd was tested for tuberculosis, and all were pronounced free from the disease.

FEEDING TESTS.

During the winter of 1905-06, a test was made of feeding steers of different ages, to determine the influence of age on beef production.

A number of grade animals raised on the farm were selected, and divided into two lots, as follows:—

Lot 1.—3 yearling steers.

Lot 2.—2 two-year-old steers.

The test was for 16 weeks, from December 15 to April 6, during which period the animals were fed the following ration daily:—

Lot 1.—Ensilage, 10 lbs.; straw, 8 lbs.; roots, 12 lbs.; meal 1½ lbs. for first month (of 4 weeks), and 3, 4 and 6 lbs. respectively, during the other three months of the test, ground linseed ¼ lb. per day for first two months, ½ lb. for third month, and none in fourth month.

Lot 2.—Ensilage, 15 lbs.; straw, 8 lbs.; roots, 15 lbs.; meal, 2 lbs. during first month, and increased by two pounds each month. Ground linseed ½ lb. per day for two months and 1 lb. for two months.

The meal used consisted of two parts of barley to one part of wheat.

The straw was cut and the required quantity mixed fresh each day with the ensilage.

Following will be found statements of the total and average gains made during the test, and of the amount of feed consumed.

WEIGHTS AND GAINS DURING TEST.

——	Lot 1.	Lot 2.
	Lbs.	Lbs.
Weight at start	1,870	1,740
End of 1st 4 weeks—Weight	1,910	1,890
" " Gain	40	150
" 2nd 4 weeks—Weight	2,030	2,040
" " Gain	120	150
" 3rd 4 weeks—Weight	2,155	2,105
" " Gain	125	65
" 4th 4 weeks—Weight	2,320	2,230
" " Gain	165	125
Total gain	450	490
Average gain per head	150	245

TOTAL AMOUNT OF FEED CONSUMED.

——	Lot 1.	Lot 2.
	Lbs.	Lbs.
Ensilage	3,360	3,360
Straw	2,688	1,792
Roots	4,032	3,360
Meal	1,218	1,120
Ground linseed	84	112

FEEDING TEST, 1906-07.

The purpose of this test was similar to that of the preceding winter, namely, to ascertain the most profitable age at which beef cattle may be fattened.

There were two lots of cattle in the test, lot 1 being composed of 5 head of two-year-old steers raised on the farm, and lot 2 of 7 three-year-old steers purchased for this test.

The following ration was fed daily during a 16 weeks' test:—

Lot 1.—Ensilage, 8½ lbs.; hay, 3 lbs.; straw, 6 lbs.; meal, 3 lbs. for first month, and increased by two pounds each month of test. Ground linseed ½ lb.

Lot 2.—Ensilage, 11 lbs.; hay, 4 lbs.; straw, 8 lbs.; meal, 4 lbs. for first month, and increased by two pounds each month. Ground linseed, ½ lb.

The meal was composed of two parts barley to one part wheat.

The hay and straw were cut up and mixed with the ensilage each day in quantity required.

Following will be found particulars of weights and gains of each lot, quantity and value of feed consumed, and financial result of the transaction. The steers in lot 1 were not bought, but for the purpose of comparison, they were valued at the same price as lot 2.

WEIGHTS AND GAINS DURING TEST.

—	Lot 1.	Lot 2.
	Lbs.	Lbs.
Weight at start of test	4,680	7,660
End of 1st 4 weeks—Weight	4,900	7,810
" " " Gain	220	150
" 2nd " Weight	5,090	7,960
" " " Gain	190	150
" 3rd " Weight	5,200	8,290
" " " Gain	110	330
" 4th " Weight	5,735	8,820
" " " Gain	535	530
Total gain during test	1,055	1,160
Average gain per head	211	166

TOTAL WEIGHT AND ESTIMATED VALUE OF FEED CONSUMED DURING 112 DAYS OF TEST.

Feed.	Value.	Lot 1.		Lot 2.	
		Lbs.	Cost.	Lbs.	Cost.
			$ cts.		$ cts.
Ensilage	$2 per ton	4,620	4 62	8,624	8 62
Hay	$8 "	1,680	6 72	3,136	12 54
Straw	$1 "	3,360	1 68	6,272	3 14
Meal	⅔c. per lb.	3,360	22 40	5,488	36 59
Ground linseed	3c. "	280	8 40	392	11 76
Total cost			43 82		72 65
Cost per head			8 76		10 38

SUMMARY OF FINANCIAL RESULT OF THE TRANSACTION.

—	Lot 1.	Lot 2.
Weight at start	4,680 lbs.	7,660 lbs.
Value at 3c. per lb.	$140 40	$229 80
Cost of feed	43 82	72 65
Total	184 22	302 45
" per head	36 84	43 21
Weight when sold	5,735 lbs.	8,820 lbs.
Less 5% shrinkage	287 "	441 "
Net weight sold	5,448 "	8,379 "
At	4 cents.	4 cents.
Amount received	$217 92	$335 16
" per head	43 58	47 88
Net profit	33 70	32 71
" per head	6 74	4 67

HORSES.

There are at present 13 horses on the farm. Since sending in my last report, one old mare has died, and one horse has been purchased.

SWINE.

There are now two breeds of swine kept on the farm, Berkshires and Large Yorkshires. There are at present 14 pigs, 5 Berkshires and 9 Yorkshires.

Since November 30, 1905, there have been sold for breeding purposes, 4 Berkshire boars and 4 sows, 7 Yorkshire boars and 14 sows, and 1 Tamworth boar and 1 sow.

POULTRY.

Four breeds of fowls are kept, Black Minorca, Barred Plymouth Rock, Light Brahma and Buff Orpington.

Settings of eggs and young fowls are sold to applicants as far as they are available.

SEED SELECTION SPECIAL.

During the winter of 1906, from January 5 to March 2, it was my privilege to be present on the Seed Special Train the greater part of the time, and address the farmers of 97 districts out of 143 through which the Seed Special passed.

The object of sending the Seed Special over such a large portion of the three prairie provinces, was to overcome, if possible, the serious injury caused by smut and weeds.

The train consisted of two, and at times three, passenger cars, in which the speaking was done, and special cars for the speakers were provided by the Department of Agriculture, Ottawa, the Canadian Pacific and Canadian Northern Railways.

Usually 6 speakers were available for all points, each speaking 20 minutes where the attendance required the use of two cars. At overflow meetings, or where three cars were occupied, each speaker took from 25 to 30 minutes.

The lectures were confined almost entirely to:—

Smut and its eradication,

The destruction of weeds, and

The necessity of sowing clean and good seed grain.

Two hundred meetings were advertised. Of these 107 were in Manitoba, 71 in Saskatchewan and 22 in Alberta. Three extra meetings were held in Alberta; two of the Manitoba points could not be reached in time through snowdrifts, and three points on account of the train being derailed.

EXCURSION TO EXPERIMENTAL FARM.

On July 19 and 20 last, excursion trains were run from all stations from Moosomin on the east to Caron on the west, from Prince Albert on the north, and from all points on the Arcola and Regina, and Soo and Estevan Railways.

The excursion was under the auspices of the Department of Agriculture at Regina, and the various agricultural societies of districts in the province adjacent to the railways.

Over 4,000 visited the farm from the outside districts, and about 1,000 from Indian Head and vicinity. A free lunch was provided on both days by the provincial government, and served by the Indian Head hospital directors. In addition to the free lunch, the department had speakers present from a distance, who addressed the people on Stock Judging, Domestic Cooking, and Weeds.

Fifteen teams, in addition to the farm's force, conveyed the visitors over the farm during the two days. The farmers in the vicinity of the town, as well as many residents of Indian Head supplied conveyances, a kindness which was greatly appreciated.

Six large tents were erected in front of the barn in which the lunch was served and meetings held, and in addition the large barn was continually crowded.

A VISIT TO THE NORTHERN PART OF THE PROVINCE.

It was my privilege in company with yourself to visit a considerable portion of Northern Saskatchewan early in September last. The districts of Saskatoon, Melfort, Humboldt and Yorkton were specially visited. Everywhere, harvest was over and threshing about commencing or already under way. In many sections the crops were very fine, and the favourable weather enabled all to be harvested in good condition.

DISTRIBUTION OF SAMPLES.

Last spring the customary distribution of the products of the farm was made to residents in the provinces of Saskatchewan and Alberta.

The number of applications was considerably in excess of those of any previous year, and the supplies available were inadequate to provide for more than about half those applying.

Following is a list of the samples sent out:—

Wheat	520	bags,	3 lb.
Oats	420	“	3 “
Barley	116	“	3 “
Pease	96	“	3 “
Sundries (flax, rye, spelt)	53	“	3 “
Potatoes	753	“	3 “
Tree seeds (Maple)	780	“	½ “
Tree seeds (Ash)	285	“	½ “
Shrub seeds	108	“	1 “
Grass seed, Brome	46	“	1 “
Grass seed, Western Rye	15	“	1 “
Small seeds, 650 bags containing 9,750 packages of shrub, flower, root and garden seeds, and corn.			
Rhubarb roots	150	packages.	
Fruit bushes and cuttings	422	“	
Tree and shrub seedlings	878	“	
Express parcels of trees and shrubs	92	parcels.	

The sample distribution for the spring of 1907 is now in progress, and will be detailed in the report for 1907.

CORRESPONDENCE.

In the five months from November 1, 1905, to March 31, 1906, 6,522 letters were received and 6,386 mailed.

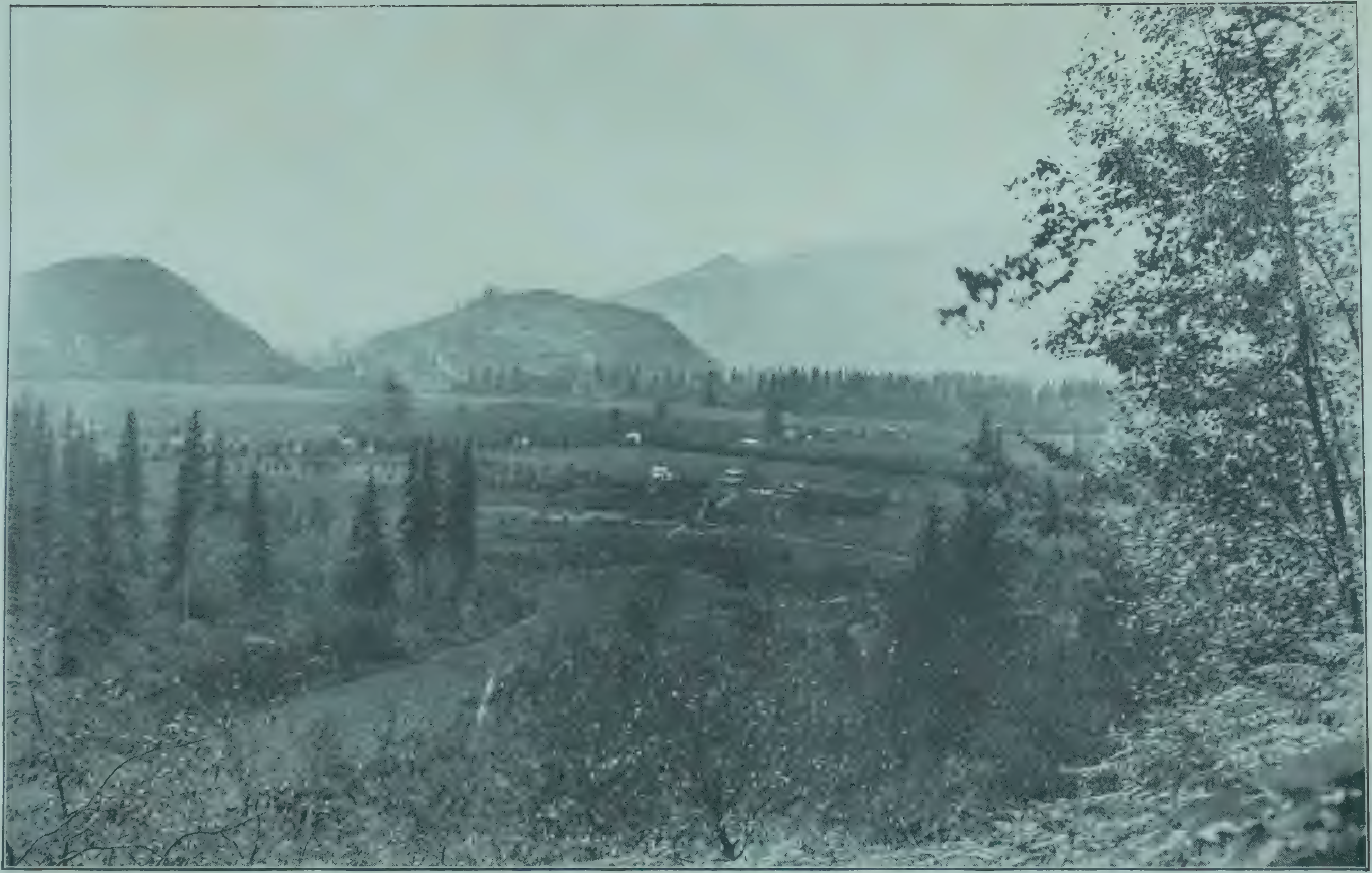
During the twelve months ending March 31, 1907, 8,469 letters were received and 8,365 mailed from this office.

In letters received reports on samples are not included, and in letters mailed circulars of instruction sent out with samples are not counted.

METEOROLOGICAL RECORD.

Month.	Temperature, Maximum.		Temperature, Minimum.		Rainfall.		Snow-fall.	Hours of Bright Sunshine.
1905.	Date.	Degrees	Date.	Degrees	Days.	Inches.	Inches.	
November	12	59	29	—23	2	·20	6·5	65·
December	6	40	3	—22	....	....	8·	77·
1906.					2	·20		142·0
January	4	40	22	—33	....	....	9·5	77·6
February	19	40	13	—38	....	....	1·	99·6
March	29 & 31	57	14	—15	1	·09	·5	153·4
April	23	84	4	13	5	1·01	6·	152·3
May	10	87	5	20	15	2·08	2·5	147·1
June	12	82	2	37	16	4·30	34·0	180·2
July	9	92	13	42	10	2·35	....	296·1
August	13	99	25	36	6	·44	....	232·5
September	6 & 7	91	28	25	3	2·22	....	202·8
October	11	75	19	13	6	·30	·5	123·8
November	6	49	30	—15	3	·42	15·	53·8
December	2	33	6 & 8	—26	....	....	9·	49·8
1907.					65	13·21		1769·0
January	9 & 10	20	14	—42	....	....	4·	98·2
February	11	41	3 & 4	—42	....	....	2·	129·1
March	20	44	1	—10	1	·10	8·	152·
					1	·10	38·5	379·3

I have the honour to be, sir,
Your obedient servant,
ANGUS MACKAY,
Superintendent.



Experimental Farm, Agassiz, B.C., as seen from first orchard bench on mountain at rear end of farm.

EXPERIMENTAL FARM FOR BRITISH COLUMBIA.

REPORT OF THOMAS A. SHARPE, SUPERINTENDENT.

AGASSIZ, B.C., March 30, 1907.

To Dr. WM. SAUNDERS, C.M.G.,
Director Dominion Experimental Farms,
Ottawa.

SIR,—I have the honour to submit the following report of the work done on the Experimental Farm at Agassiz during the year 1906.

This year has been, on the whole, a fairly good one for most farm crops. The first three months of the year were very mild and pleasant, the lowest temperature in January being six degrees of frost on the 20th, with a rainfall of four and a quarter inches, and twenty-one inches of snow; this, however, did not all come in one storm and did not lie long and no drifts formed. February was equally mild and pleasant, the lowest temperature showing three degrees of frost on the 9th. Rainfall for the month nearly four and three quarter inches, and no snow. March was, on the whole, cooler, with a lighter rainfall and a little sharper frost than either January or February, the lowest temperature being nine degrees of frost on the 13th and a rainfall for the month of very little over two inches and no snow. Snowdrops, Narcissus and Hyacinths bloomed freely in the open garden from the first of the month, and Apricot and Japanese plum trees bloomed in the third week. Grass made a strong growth during the month and clover was six inches high by the end of March. April was mostly fair and clear, but the nights were cool and there were several sharp frosts, 30 degrees being the lowest on the 12th. The prevailing winds were north and northwest, and cold, vegetation not coming forward as rapidly as promised in the last few days of March, and the cold winds with showers and light frosts were very injurious to early blooming fruit trees and plants, a light frost with a good many cool rain showers in May, injured the fruit crop, but the rains were helpful to the hay and grass crops. The showery weather with considerable windy weather in April and May rendered spraying very difficult and frequently made the work ineffective. June was very favourable for the growth of most grain and root crops except corn, which did not grow well until the end of the month, owing to the rain and cool winds. There was rain on nineteen days and a cool breeze almost continuously, which prevented the corn from making much progress. July was a comparatively dry and warm month, the rainfall being only a little over $2\frac{1}{4}$ inches as compared with nearly $7\frac{1}{2}$ inches for May and $6\frac{1}{2}$ inches in June. The frequent showers in June rendered the curing of the first crop of clover almost impossible and it certainly was not practicable to make a really good hay of it, and as it could be made into a very fine quality of ensilage, all of the first crop was put into the silo.

The weather during August was dry and warm, the rainfall being only a little over one inch, and corn grew finely and the clear days of bright sunshine ripened the plums with very little rot, and enabled farmers to harvest the grain and second crop of clover in fine condition. September was rather showery, the rainfall was over six and a quarter inches, and the damp weather was favourable for root crops and late grass.

FRUIT CROPS.

The unfavourable weather in April and May caused some varieties of fruits to drop when forming and many varieties of apples, pears and plums, which showed a full bloom did not have any fruit, or had a very light crop, but many other varieties bore full crops and the fruit was very free from blemishes and disease.

MOUNTAIN ORCHARDS.

The plum, apple, and pear trees on the different benches on the mountains were generally well loaded with fruit. Unfortunately the crop of wild fruit was poor and the bears made free with the early apples and plums and took all the fruit, much of it before it was fully grown.

ORNAMENTAL TREES AND SHRUBS.

The ornamental flowering shrubs, and forest trees have all made a fine strong growth and are becoming very handsome.

NUT TREES.

The nut trees and filbert bushes have done very well; the English, Japanese and American black walnuts all bore fruit, and some of the Spanish and Japanese chestnuts had a few nuts.

The filberts bore better this year than ever before, but it is almost impossible to save them, as the blue jays commence to take them before they are matured. The walnut and chestnut trees planted on the mountain are making fair progress, but receiving no cultivation, they do not grow as rapidly as those on the level land. All the nuts that were saved were distributed to planters in different parts of the province and good reports of the progress of young trees grown from nuts sent out in previous years continue to be received.

DITCHING.

About 200 yards of new ditch have been dug this year, and the old ditches were cleaned out.

NEW BREAKING.

No new breaking has been done this year, but about three acres have been got ready and will be ploughed as soon as possible in spring and put in condition for a crop next season.

CATTLE.

The herd of registered Shorthorn cattle now numbers thirty-five head, as follows: twelve cows, four heifers, five heifer calves, 1 stud bull, 1 yearling bull, ten bull calves and two steers. Since my last report three bulls have been sold to head herds and two cows for beef.

SHEEP.

The flock of sheep numbers seventeen ewes, 1 stud ram and three ram lambs. During the year three ram lambs were sold as breeders, and seven animals to the butcher.

PIGS.

The stock of pigs consists of seven pure-bred Berkshires and eight pure-bred Yorkshires. A number of both breeds have been sold as breeders and the surplus to the butcher.

HORSES.

Since my last report another of the old horses has died. Of the original lot brought here in 1889, three geldings remain; as they are all over twenty years old and have done a great deal of very hard work, they are nearly worn out. Two very fine teams of young horses, a driving mare and the three old horses are our present horse force.

BEES.

The past season has for some reason been a poor one for bees, several swarms not having stored enough honey to carry them to the end of the year. There are seven swarms now, all well supplied with stores to carry them through to another honey season.

POULTRY.

There are on the farm this year White Wyandottes, Buff Orpingtons, Barred Plymouth Rocks, Black Minorcas and Rose Comb Brown Leghorns.

The R. C. B. Leghorns have been the best layers, but their eggs are rather small. Black Minorcas come next in number of eggs—which are large. Neither of these breeds make good table birds, but they make pretty good broilers at from ten to twelve weeks old, if well fed.

Of the heavier breeds, this year the Buff Orpingtons laid best, the B. P. Rocks and White Wyandottes being about equal.

The White Wyandotte chickens matured a little the earliest; but the Buff Orpington and B. P. Rocks make larger birds at maturity, and the Buff Orpingtons with us, put on more breast meat than the other two breeds.

A good strain of any one of these three breeds of fowls make good layers, also good table birds. Our hens are kept in breeding pens—with yards attached—from January 1 to July 1, and they are at large during the rest of the year.

They are fed mixed grain, about ¼ wheat, ½ oats, and ¼ pease, and in the autumn they get some sunflower seed, also a few ears of corn occasionally during the winter. While they are confined we give them as much variety of food as possible with what we have on hand. In the coldest weather in winter they get a mash of boiled roots mixed with chop of any kind which we have. A cabbage head or other vegetable is always before them, also grit or finely crushed clam shells, and a box of sifted coal ashes to dust in.

We have not had any disease among the poultry this year, except a few cases of rheumatism, which was probably caused by the wet weather in the autumn, but as in previous years, crows, hawks and skunks have been very troublesome, carrying off a great many chickens, even after they were well grown. The chickens were hatched and reared by hens. The percentage hatched and raised has been about the same as was had with an incubator and brooder. The only advantage in using an incubator and brooder is that a large number of chickens can be hatched and raised early and at one time. The henhouse is sprayed with whitewash in which is mixed some carbolic acid, and the yards are dug about once a month.

EXPERIMENTS WITH OATS.

Thirty-seven varieties of oats were sown in the test plots this year, the size of the plots were one-fortieth of an acre each. The soil was a sandy loam that had produced a crop of roots in 1905, and these had been grown on a heavy aftermath of clover that had also been heavily dressed with stable manure in the previous autumn and thoroughly worked into the soil with spade harrow and drag, and was in good condition, but the dry, hot season hastened the ripening and somewhat lessened the yield.

The grain is plump, bright-coloured and a very good sample. The plots were all sown on April 12.

OATS—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.		Weight per Bushel.	Rusted.
				In.		In.		Lbs.	Bush.	Lbs.	Lbs	
1	Olive Black	Aug. 1	111	45	Strong	9	Sided	3,520	72	32	37	No rust.
2	Lincoln	" 2	112	46	"	10	Branching	3,900	72	12	33	"
3	Goldfinder	" 4	114	46	Medium	9	Sided	3,4[illegible]0	71	26	33	"
4	Virginia White	July 31	110	50	Strong	9½	Branching	3,080	71	26	35	"
5	Black Beauty	Aug. 1	111	46	"	10	"	3,580	71	16	36	"
6	American Beauty	" 1	111	47	"	11	"	2,960	70	20	33	"
7	Bavarian	" 7	117	47	"	11	"	4,480	68	8	32	Slightly.
8	White Giant	" 2	112	41	"	9	"	3,160	65	30	34½	"
9	Golden Fleece	" 3	113	47	"	10	"	4,160	65	30	30½	No rust.
10	Buckbee's Illinois	" 1	111	46	"	9	"	4,280	64	24	33½	"
11	Golden Giant	" 7	117	45	Stiff	9	Sided	5,040	63	18	31	"
12	Swedish Select	" 2	112	47	"	10	Branching	4,000	63	18	32	"
13	Improved American	" 3	113	47	"	9	"	4,480	62	12	33¼	"
14	Milford White	" 3	113	42	Soft, weak	9	Sided	4,280	62	12	35	"
15	Improved Ligowo	" 5	115	42	Strong	9	Branching	3,448	62	12	32	"
16	Siberian	" 3	113	47	"	10	"	3,320	61	26	34	"
17	Pioneer	" 1	111	41	"	10	"	2,920	61	16	38¼	"
18	Thousand Dollar	" 5	115	41	Medium	9	"	3,460	60	20	34¼	Slightly.
19	Holstein Prolific	" 1	111	46	Strong	9	"	3,320	60	6	32½	No rust.
20	Waverley	" 7	117	48	"	11	"	3,360	60	..	31½	Slightly.
21	Milford Black	" 1	111	42	"	9	Sided	4,140	59	24	37	"
22	Irish Victor	" 1	111	48	"	10	Branching	4,820	59	14	34½	No rust.
23	Danish Island	" 7	117	46	"	11	"	3,760	58	28	34	Slightly.
24	Banner	" 4	114	42	Stiff	9	"	4,410	58	28	32¼	"
25	Abundance	" 1	111	48	"	11	"	4,200	58	18	34	No rust.
26	Joanette	" 1	111	40	Medium	10	"	3,040	57	22	34	"
27	Kendal Black	" 2	112	41	Strong	10	Sided	4,440	57	22	38	"
28	Kendal White	" 5	115	46	"	10	"	4,400	56	16	32	"
29	Tartar King	July 31	110	44	"	11	"	4,060	54	24	34	"
30	American Triumph	Aug. 2	112	47	"	10	Branching	4,120	52	32	32	"
31	Wide Awake	" 5	115	44	Medium	9	"	4,080	51	26	32	"
32	Columbus	" 5	115	42	Strong	10	"	3,280	50	30	34	"
33	Sensation	" 3	113	40	Medium	9	"	3,960	50	20	32¼	"
34	Twentieth Century	" 1	111	42	"	10	"	3,140	48	28	28	Slightly.
35	Storm King	July 31	110	48	Stiff	11	Sided	2,880	47	2	32¼	No rust.
36	Mennonite	Aug. 1	111	45	Strong	11	Branching	4,120	45	30	34	"
37	Golden Beauty	" 3	113	42	Medium	9	"	4,520	43	18	32	Slightly.

EXPERIMENTS WITH BARLEY.

The soil chosen for the test plots of oats and barley was a sandy loam which had a heavy clover aftermath turned under in the autumn of 1904, was thoroughly cut with the spade harrow and dressed with about 12 tons per acre of barnyard manure, which was then worked into the soil by spade harrow and drag, in preparation for a crop of roots which grew on it in 1905. It was ploughed early in March of this year, and worked with disk and drag every few days to clean it of weeds, and fit it for the experimental plots. The barley was all sown April 16 in plots of one-fortieth of an acre and promised to be an extra heavy crop, but the very hot weather during the latter part of July ripened it a little too hurriedly, so that although fine and bright in colour, the berry is not as plump as was expected.

Fourteen varieties of two-rowed, and eighteen varieties of six-rowed barley were tested. There was no smut or rust on any of the barley plots.

SIX-ROWED BARLEY—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	Number of Days Maturing.	Character of Growth.	Length of Straw.	Weight of Straw.	Length of Head.	Yield per Acre.		Weight per Bushel.
					In.	Lbs.	In.	Bush.	Lbs.	Lbs.
1	Mensury	July 25	100	Strong	46	3,620	3	49	28	48
2	Odessa	" 25	100	"	45	3,040	3	47	4	49
3	Empire	" 27	102	"	46	2,800	4	46	32	50
4	Blue Long Head	" 27	102	"	42	3,120	2½	43	16	44½
5	Claude	" 24	99	"	40	2,960	2½	42	24	51
6	Nugent	" 26	101	"	40	2,310	2½	39	18	49
7	Yale	" 27	102	"	43	3,120	3	39	8	49
8	Trooper	" 30	105	"	47	3,760	3	39	8	49½
9	Stella	" 28	103	"	42	3,340	3	37	24	48½
10	Common	" 26	101	"	44	3,100	3½	36	32	48
11	Argyle	" 28	103	"	44	3,640	3½	36	22	49¼
12	Brome	" 28	103	"	43	3,860	4	36	12	50
13	Champion	" 23	98	"	46	3,280	3	35	40	44
14	Oderbruch	" 26	101	"	45	3,520	3	35	..	51½
15	Albert	" 25	100	"	44	4,560	2½	34	8	50
16	Summit	" 30	105	"	48	3,800	3	33	16	51¼
17	Mansfield	" 28	103	"	47	3,640	3	32	24	49
18	Royal	" 26	101	"	44	3,480	3	31	32	49½

TWO-ROWED BARLEY—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	Number of Days Maturing.	Character of Growth.	Length of Straw.	Weight of Straw.	Length of Head.	Yield per Acre.		Weight per Bushel.
					In.	Lbs.	In.	Bush.	Lbs.	Lbs.
1	Clifford	July 28	103	Strong	48	3,320	3	46	32	51
2	Swedish Chevalier	" 30	105	"	48	2,950	4½	42	14	52
3	French Chevalier	" 31	106	"	41	3,400	4	41	42	52
4	Dunham	" 31	106	"	46	2,400	3	41	32	49½
5	Danish Chevalier	" 31	106	"	42	3,420	4	41	12	52
6	Sidney	" 30	105	"	40	4,040	4	41	2	51½
7	Harvey	" 31	106	"	48	3,240	4	40	40	50
8	Standwell	Aug. 1	107	"	41	3,000	3	40	..	53
9	Beaver	July 30	105	"	46	3,400	3½	37	24	52
10	Invincible	" 31	106	"	40	2,840	3½	36	32	49
11	Gordon	" 31	106	Medium	42	2,980	4	34	36	52
12	Jarvis	Aug. 1	107	Strong	45	3,760	4	34	8	48
13	Canadian Thorpe	July 30	105	"	42	2,600	3	32	44	51½
14	Logan	" 30	105	"	42	4,000	4	27	4	49

WHEAT.

Owing to the prevalence of the wheat midge *Diplosis tritici* in the Agassiz valley, the plots of spring wheat, also those of durum wheat and of emmer and spelt, have all been so much injured as to make the tests for 1906, as to the relative productiveness of the varieties of no value, hence the yields for 1906 are not given. It is proposed to discontinue the wheat plots at Agassiz for a year with the hope of thus getting rid of this insect pest.

EXPERIMENTS WITH PEASE.

Of field pease, 26 varieties were sown in the test plots this year on clover sod. The soil was a sandy loam. The land was ploughed late in the fall, and as early as the work could be done, it was thoroughly cut up with the spade harrow and fined with the spike-tooth drag. There were some large apple trees in the field, and wherever a plot was sown between rows of these, the yield was somewhat lessened. The plots were one-fortieth of an acre each, and all were sown on April 17.

PEASE—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	Number of Days Maturing.	Character of Growth.	Length of Straw.	Weight of Straw.	Length of Pod.	Size of Pea.	Yield per Acre.		Weight per Bushel.
					In.	Lbs.	In.		Bush.	Lbs.	Lbs.
1	English Grey	Aug. 11	111	Strong	48	2,400	3	Medium	50	..	63½
2	White Marrowfat	" 8	109	"	52	2,860	3	Large	49	..	63½
3	Early Britain	" 4	105	"	50	3,080	3	Medium	48	40	62½
4	Picton	" 10	111	"	54	3,000	3	"	46	40	64
5	Kent	" 7	108	"	52	2,820	2½	Large	46	20	64
6	Mummy	" 10	111	"	48	2,680	3	Medium	45	20	64
7	Mackay	" 4	105	"	48	3,020	3	"	43	..	63
8	Golden Vine	" 8	109	"	52	3,260	2½	Small	42	40	65
9	Prince Albert	" 7	108	Medium	48	2,820	3	"	41	20	65
10	Archer	" 4	105	Strong	52	2,500	3	Medium	39	..	64
11	Prince	" 11	112	"	42	3,600	3	Large	38	40	63½
12	Arthur	" 7	108	"	48	3,250	2½	"	38	10	65
13	Wisconsin Blue	" 8	109	"	50	2,920	3	Small	38	..	65½
14	Daniel O'Rourke	" 1	102	"	56	3,540	2	"	37	40	63
15	Crown	" 8	109	"	50	2,860	3	"	37	20	65
16	White Wonder	" 5	106	"	62	3,080	3	Medium	36	40	63
17	Gregory	" 5	106	"	50	3,620	2½	"	36	20	64½
18	Nelson	" 9	110	"	50	3,440	3	"	36	..	64
19	Prussian Blue	" 3	104	"	48	3,280	2½	"	35	20	65
20	Chancellor	" 3	104	Medium	50	3,320	2½	Small	34	40	65
21	Pearl	" 6	107	"	72	3,570	3	Large	32	30	63¼
22	Duke	" 12	113	"	54	3,320	3	"	29	40	64½
23	Agnes	" 10	111	Strong	56	4,000	3	"	28	..	66
24	Paragon	" 10	111	"	63	3,660	3½	Medium	27	20	64
25	Black Eye Marrowfat	" 10	111	"	62	3,240	3½	Large	26	..	65

EXPERIMENTS WITH CORN.

There were twenty-three varieties of corn planted in the variety test this year. All were planted May 4 except one variety, the Red Cob Ensilage; that was planted May 25. The soil is a gravelly loam which had been heavily manured with barnyard manure in the winter of 1904, and fitted for a crop of wheat which was grown on it in 1905.

The corn was sown earlier this year than usual and had the season been favourable, we should have had a better yield of more matured corn. The months of May and most of June were generally wet, cold and unfavourable for corn. In July and August it was dry and hot, and the soil being gravelly, soon dried out and the crop suffered for lack of moisture. The yield per acre is calculated from sixty-six feet of two rows both in hills and drills. The drills were three feet apart and the corn thinned to six inches apart in the drill, and the hills were three feet apart each way and three or four stalks left in each hill.

CORN—TEST OF VARIETIES.

Number.	Name of Variety.	Character of Growth.	Height.	Leafiness.	When Cut.	Condition when Cut.	Weight per Acre grown in rows.		Weight per Acre grown in hills.	
			Inches.				Tons.	Lbs.	Tons.	Lbs.
1	Pride of the North......	Strong......	112	Very leafy	Oct. 2.	Early milk..	24	1,280	23	1,300
2	Red Cob Ensilage..........	Very strong.	126	"	" 2.	" ..	20	1,580	19	390
3	Giant Prolific Ensilage......	"	120	"	" 2.	Ears formed.	20	40	18	960
4	Superior Fodder...........	"	116	"	" 2.	" ..	19	1,490	17	1,420
5	White Cap Yellow Dent..	"	131	"	" 2.	Early milk..	19	280	19	1,490
6	Thoroughbred White Flint..	Strong......	98	"	" 2.	In silk......	18	1,620	18	740
7	Champion White Pearl......	"	113	"	" 2.	Late milk...	17	1,860	18	411
8	Compton's Early...........	"	114	"	" 2.	Early milk..	17	1,805	15	1,460
9	Mammoth Cuban,.........	Very strong.	118	"	" 2.	" ..	17	1,530	18	410
10	Salzer's All Gold...........	Strong	108	"	" 2.	In silk......	17	1,310	16	1,220
11	Early Butler...............	"	90	"	" 2.	Early milk..	17	980	17	320
12	Wood's Northern Dent......	Very strong	104	"	" 2.	" ..	16	1,600	16	1,820
13	North Dakota White........	"	106	"	" 2.	" ..	16	560	15	140
14	King Philip...............	Strong	109	"	" 2.	Late milk ..	14	1,260	13	510
15	Angel of Midnight.........	"	92	"	" 2.	Early milk..	14	1,040	15	30
16	Early Mastodon...........	Very strong.	116	"	" 2.	" ..	14	710	15	140
17	Longfellow..............	"	106	"	" 2.	Roasting ...	13	1,280	12	1,190
18	Eureka..................	Strong	118	"	" 2.	In silk......	13	620	13	1,060
19	Early Longfellow...........	"	100	"	" 2.	Roasting ...	12	310	13	180
20	Cloud's Early Yellow.......	"	98	"	" 2.	Early milk .	12	90	11	1,880
21	Evergreen Sugar..........	"	108	"	" 2	" ..	11	1,760	11	440
22	Early Leaming...........	"	108	"	" 2.	Late milk ..	11	1,430	13	620
23	Selected Leaming..........	Very strong.	118	"	" 2.	Early milk..	11	220	11	990

CORN SOWN AT DIFFERENT DISTANCES APART.

The same varieties were used in this test as in previous years, and as in the past the widest rows gave the most matured corn. These plots were planted alongside of the varietal tests and under the same conditions. The growth appears to be as mature, the ears as large and as plentiful at 35 inches in the drill as at 42 inches, and there does not seem to be any advantage to compensate for the extra ground taken up by the wider rows.

CORN SOWN AT DIFFERENT DISTANCES APART

Name of Variety.	Date of Sowing.	Character of Growth.	Distance in rows.	Distance in hills.	Condition when cut.	Weight per Acre grown in rows.		Weight per Acre grown in hills.	
			In.	In.		Tons.	Lbs.	Tons.	Lbs.
Champion White Pearl	May 4	Strong	21	21	Early milk..	25	1,480	24	1,594
" "	" 4	"	28	28	" ..	20	1,489	20	392
" "	" 4	"	35	35	Late milk...	17	1,300	17	169
" "	" 4	"	42	42	" ..	15	926	14	1,983
Longfellow	" 4	"	21	21	Early milk..	19	1,847	20	1,108
"	" 4	"	28	28	" ..	16	80	15	843
"	" 4	"	35	35	Late milk...	16	1,264	15	865
"	" 4	"	42	42	Glazing.....	14	380	14	1,417
Selected Leaming..........	" 4	" ...	21	21	Early milk..	19	280	19	1,222
"	" 4	" ...	28	28	" ..	15	266	14	1,131
"	" 4	"	35	35	Late milk...	12	1,796	13	475
"	" 4	" ...	42	42	" ..	10	365	10	835

EXPERIMENTS WITH FIELD ROOTS.

All the experiments with field roots were alongside each other on sandy loam that had a heavy clover stubble turned under in the autumn of 1904, and a crop of field pease the summer of 1905, followed by a heavy dressing of stable manure in the winter of 1905, which was well worked into the soil with drag and spade harrow and the soil kept open and mellow until the roots were sown in 1906. Two sowings of each variety were made fourteen days apart in drills thirty inches apart. Twenty varieties of turnips, sixteen of mangels, ten of carrots and eight of sugar beets were sown. The first sowing of turnips was on May 7, the second sowing on May 21; with all the other roots the first sowing was made April 21, and the second May 5. Four rows each 100 feet long were sown and the yield per acre was found by weighing the crop from 66 feet of the two centre rows of each sowing of every variety. They were all harvested October 30 and 31, excepting the turnips. These were taken up from both sowings on November 1. The spring was so cold and showery that the seed did not germinate freely and the summer and early autumn so dry that the root crops were unusually light.

TURNIPS—TEST OF VARIETIES.

Number.	Name of Variety.	Yield per Acre.							
		1st Plot.				2nd Plot.			
		Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
1	Good Luck........	23	200	770	..	15	1,150	519	12
2	Kangaroo.............	21	1,032	717	12	18	1,488	624	48
3	Jumbo	21	600	710	..	17	1,640	594	..
4	Halewood's Bronze Top..............	21	240	704	..	17	848	580	48
5	Perfection Swede.	20	1,760	696	..	17	584	576	24
6	Emperor.	18	960	616		17	584	576	24
7	Imperial....	18	432	607	12	16	1,792	563	12
8	Magnum Bonum	17	1,376	589	36	13	928	448	48
9	Elephant's Master	16	208	536	48	14	1,568	492	48
10	New Century...........	16	142	535	42	16	1,192	553	12
11	Sutton's Champion...	15	1,944	532	24	16	184	536	24
12	Carter's Elephant.	15	1,680	528	..	21	240	704	..
13	Drummond Purple Top	15	1,152	519	12	15	360	506	..
14	East Lothian......	14	1,172	486	12	16	340	539	...
15	Bangholm Selected	14	488	474	48	10	136	335	36
16	Hall's Westbury.	13	928	418	48	15	96	501	36
17	Skirving's.	13	664	441	24	7	1,078	250	48
18	Hartley's Bronze..	12	552	409	12	8	368	272	48
19	Selected Purple Top.............. ...	11	1,760	396	..	10	1,120	352	..
20	Mammoth Clyde...........	10	1,120	352	...	7	784	246	24

MANGELS—TEST OF VARIETIES.

Number.	Name of Variety.	Yield per Acre.							
		1st Plot.				2nd Plot.			
		Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
1	Yellow Intermediate	27	852	914	12	17	512	575	12
2	Mammoth Yellow Intermediate	20	1,712	695	12	13	928	448	48
3	Triumph Yellow Globe	20	1,184	686	24	14	248	470	48
4	Leviathan Long Red	19	544	642	24	13	1,720	462	..
5	Giant Sugar Mangel	18	960	616	..	8	368	272	48
6	Half Sugar Rosy	18	168	602	48	6	1,200	220	..
7	Half Sugar White	16	868	547	48	13	136	435	36
8	Lion Yellow Intermediate	15	1,680	528	..	10	1,120	352	..
9	Selected Mammoth Long Red	14	1,040	484	..	10	1,252	354	12
10	Mammoth Long Red	14	644	477	24	13	532	442	12
11	Giant Yellow Intermediate	13	1,720	462	..	6	1,728	228	48
12	Prize Mammoth Long Red	11	1,892	398	12	7	652	244	12
13	Selected Yellow Globe	11	1,826	397	6	6	1,332	222	12
14	Giant Yellow Globe	11	1,760	396	..	5	1,748	195	48
15	Prize-winner Yellow Globe	11	176	369	36	8	236	270	36
16	Gate Post	10	1,856	364	16	6	1,464	224	24

CARROTS—TEST OF VARIETIES.

Number.	Name of Variety.	Yield per Acre.							
		1st Plot.				2nd Plot.			
		Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
1	Giant White Vosges	37	1,340	1,089	..	19	1,540	659	..
2	Carter's Orange Giant	31	1,756	1,062	36	25	160	836	..
3	Improved Short White	31	964	1,049	24	21	1,524	752	24
4	New White Intermediate	28	1,948	965	48	25	1,612	860	12
5	White Belgian	28	232	937	12	25	688	844	48
6	Mammoth White Intermediate	26	1,592	893	12	20	1,448	690	48
7	Half Long Chantenay	26	404	873	24	18	960	616	..
8	Early Gem	24	576	809	36	17	1,904	598	24
9	Ontario Champion	23	1,784	796	24	16	736	545	36
10	Long Yellow Stump-rooted	22	1,672	761	12	19	1,804	663	24

SUGAR BEETS—TEST OF VARIETIES.

Number.	Name of Variety.	Yield per Acre,							
		1st Plot.				2nd Plot.			
		Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
1	Improved Imperial	22	1,540	759	..	12	1,344	422	24
2	Danish Red Top	21	1,032	717	12	17	452	574	12
3	Red Top Sugar	20	1,712	695	12	10	64	334	24
4	Danish Improved	19	1,072	651	12	9	744	312	24
5	Wanzleben	18	1,356	622	36	13	532	442	12
6	Royal Giant	15	1,680	528	..	7	1,546	259	6
7	French Very Rich	12	1,080	418	..	6	672	211	12
8	Vilmorin's Improved	10	64	334	24	6	1,068	217	48

POTATOES.

Thirty-two varieties of potatoes were planted in the experimental plots. Four rows of one hundred feet long were planted with the rows two and a half feet apart, and the sets about one foot apart in the rows. The yield has been computed from the crop obtained from sixty-six feet of the two middle rows.

All were planted May 1, on sandy loam, which had received a heavy dressing of manure in the spring of 1905 and was in good condition, but the very dry July and August lessened the yield.

The tubers were smooth, of very fine quality and with very little rot, only four of the varieties being so affected. They were all dug on October 17.

POTATOES—TEST OF VARIETIES.

Number.	Name of Variety.	Yield per Acre.										Form and Colour.
		Total.		Sound.		Rotten.		Marketable.		Unmarketable.		
		Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	
1	Late Puritan	611	36	581	36	30	..	583	..	58	36	Long, white.
2	Dreer's Standard	589	36	589	36			501	..	88	36	"
3	Vermont Gold Coin	514	48	509	..	5	48	443	..	66	..	"
4	American Wonder	508	12	508	12			407	12	101	..	Long, flat, white
5	Ashleaf Kidney	495	..	495	..			347	..	148	..	Round, white.
6	State of Maine	466	24	466	24			397	24	69	..	Long, pink.
7	Everett	453	12	453	12			363	..	90	..	Long, rose.
8	Rochester Rose	452	..	430	..	22	..	363	..	67	..	Oblong, red.
9	Sabean's Elephant	435	36	435	36			370	36	65	..	Long, white.
10	Carman No. 1	404	48	404	48			343	48	61	..	"
11	Maule's Thoroughbred	402	36	402	36			324	36	78	..	Long, rose.
12	I.X.L	396	..	396	..			339	..	57	..	Long, flat, pink.
13	Morgan Seedling	363	..	363	..			311	..	52	..	Long, pink.
14	Uncle Sam	360	48	360	48			306	40	54	..	Round, white.
15	Empire State	356	24	356	24			281	..	71	24	Long, flat, white.
16	Holborn Abundance	336	36	336	36			270	36	66	..	Round, white.
17	Carman No. 3	330	..	330	..			290	..	40	..	"
18	Early White Prize	330	..	330	..			281	..	49	..	Long, white.
19	Burnaby Mammoth	323	24	323	24			275	..	48	24	Oblong, rose.
20	Pearce	297	..	297	..			254	..	43	..	Long, red.
21	Vick's Extra Early	281	36	281	36			225	36	56	..	Round, rose.
22	Dalmeny Beauty	277	12	277	12			250	12	47	..	Round, white.
23	Country Gentleman	272	48	272	48			189	48	83	..	Oblong, pink.
24	Dooley	268	24	268	24			229	..	39	24	Oblong, white.
25	Early Rose	264	..	264	..			211	..	53	..	Oblong, rose.
26	Bovee	264	..	264	..			215	..	49	..	Long, rose.
27	Irish Cobbler	248	36	248	36			204	..	44	36	Round, white.
28	Reeve's Rose	218	56	218	56			187	..	31	56	Long, rose.
29	Early Envoy	218	56	218	56			176	..	42	56	Oblong, pink and white.
30	Money Maker	211	12	199	..	12	12	160	12	51	..	Long, white.
31	Pingree	200	12	200	12			133	12	67	..	"
32	Canadian Beauty	171	36	171	36			120	..	51	36	Oblong, flat, white.

POTATOES.—EARLY AND LATE PLANTING.

Two varieties were chosen for this test. They were planted alongside of the other test plots and the conditions of soil and treatment were the same. The Early St. George, being an early potato, does not yield so well when planted late. The Enormous, being a late potato, not only increases in yield, but the per cent of marketable potatoes is larger in the late planted plots than in the earlier.

Name of Variety.	Planted.	Yield per Acre									
		Acre.		Sound.		Rotten.		Marketable.		Un-marketable.	
		Bush.	Lbs.	Bush.	Lbs.	Bush	Lbs.	Bush.	Lbs.	Bush.	Lbs.
Early St. George	April 5	523	36	523	36	None		445	..	78	36
"	" 12	545	36	545	36	"		462	36	83	..
"	" 19	466	24	466	24	"		382	30	83	54
"	" 26	400	24	400	24	"		320	24	80	..
"	May 3	365	12	365	12	"		292	12	73	..
"	" 10	352	..	352	..	"		281	36	70	30
Enormous	April 5	426	48	426	48	"		375	48	51	..
"	" 12	462	..	462	..	"		415	..	47	..
"	" 19	488	24	488	24	"		439	34	48	50
"	" 26	516	38	516	38	"		463	20	53	18
"	May 3	554	24	554	24	"		499	54	54	30
"	" 10	592	20	592	20	"		545	20	47	20

CLOVER EXPERIMENTS.

These are in continuation of those for last year on clover and alfalfa seed treated with the special culture, and a similar area alongside sown with a similar quantity of untreated seed. The growth of clover on both plots, treated and untreated, was very good and two crops of clover were cut and made into hay. The alfalfa did not amount to much and the only growth worth cutting, on either treated or untreated plot, was where a red clover plant had come in as a volunteer. The alfalfa was gone over with the mower June 23, and again July 21, but there was not enough to rake up.

The red clover plots were cut June 20 and again on July 19, and the cured weights were as follows, the plots being each half an acre.

Plot 1.—Red Clover, Treated Seed.

	Lbs.
First crop cured hay	1,985
Second cutting	1,385

Plot 2.—Red Clover, Untreated Seed.

First crop cured hay	1,945
Second cutting	1,370

There was evidently no advantage derived from the treatment of the seed.

A third cutting might have been made in early September, but the land was broken up and prepared for orchard planting.

FODDER PLANTS.

The following forage plants were sown in plots of one-fortieth of an acre each on May 3. The land was a sandy loam which had been manured with about ten tons of fresh farmyard manure the previous fall, which was well worked into the soil with disk and spike-tooth harrow.

Plot 1.—Soja Beans.—Sown in drills 21 inches apart, cut October 2. Length of stalk 30 inches; length of pod 1 to 1½ inches; weight of crop 298 lbs. Per acre 5 tons 1,920 lbs.

Plot 2.—Soja Beans.—Drills 28 inches apart, cut October 2. Length of stalk 30 inches; length of pod 1 to 2 inches; weight of crop 274 lbs. Per acre 5 tons 1,060 lbs., better furnished with pods than plot 1.

Plot 3.—Soja Beans.—Drills 35 inches apart, cut October 2. Length of stalk 30 inches; pods 1 to 2 inches and well filled with beans; weight of crop 283 lbs. Per acre, 5 tons 1,920 lbs. Stalk very branching, leafy and better furnished with pods than those in the narrower drills.

Plot 4.—Horse Beans.—Drills 21 inches apart, cut October 2. Length of stalk 26 inches; pods 2 to 2½ inches long. Did not germinate well and the stand was very uneven. Weight, 214 lbs. Per acre, 4 tons 560 lbs.

Plot 5.—Horse Beans.—Drills 28 inches apart, cut October 2. Length of stalk 28 inches; pods 2 to 2½ inches long; weight of crop 201 lbs. Per acre 4 tons 40 lbs.

Plot 6.—Horse Beans.—Drills 35 inches apart, cut October 2. Length of stalk 26 to 30 inches; pod 2½ to 3 inches long and fairly well filled out with beans. Weight of crop 211 lbs. Per acre 4 tons 440 lbs.

Plot 7.—Hungarian Millet.—Sown June 1, alongside of the other plots and on similar soil, cut September 20. Stalks 26 to 28 inches long; heads 3 to 4½ inches long. Weight of crop 212 lbs. Per acre 4 tons, 480 lbs.

Plot 8.—Pearl Millet.—Seed did not germinate well. Stalks 28 inches long; heads 2 inches long; weight of crop 128 lbs. Per acre 2 tons 1,120 lbs. A poor stand.

Plot 9.—Algerian Millet.—Did not germinate freely and produced a very uneven stand. Stalks 24 to 30 inches long; heads 3 to 4 inches. Weight of crop 134 lbs. Per acre 2 tons 1,360 lbs.

Plot 9.—Italian Millet.—Stalks 34 to 38 inches long; heads 6 inches; weight of crop 328 lbs. Per acre 6 tons 1,120 lbs. A fair even stand.

Plot 10.—White Round French Millet.—Stalks 20 to 24 inches long; heads 2 to 2½ inches; weight of crop 214 lbs. Per acre 4 tons 560 lbs. A very uneven stand and a weak growth.

SUNFLOWERS.

An eighth of an acre of sunflowers was sown in drills three feet apart and thinned to six inches in the drill. The seed germinated well and the plants made fine heads on stalks from four to seven feet long. The heads ripened very unevenly and the birds began to eat the seed as soon as it was in the dough stage and destroyed a large per cent of the earliest ripened heads. A small plot is well worth raising as it furnishes a very fine food for the poultry in the autumn when they are moulting.

SUMMARY OF CROPS.

			Tons.	Lbs.
Hay			39	1,700
Ensilage—				
Clover	70	....		
Corn	28	....		
	—	——	98	....
Roots—				
Turnips	47	1,000		
Carrots	7	1,200		
Mangels	6	1,700		
Potatoes	5	200		
	—	——	61	1,900

	Bush.	Lbs.	Tons.	Lbs.
Fall Wheat	16	55	..	1,075
Rye	22	08	..	1,240
Barley	35	45	..	1,725
Pease	85	10	2	1,110
Oats	92	32	1	1,600
Mixed grains, oats and pease	1,152			

SAMPLES DISTRIBUTED.

Scions and cuttings	packages	193
3 lb. samples seed potatoes	"	217
3 lb. samples oats	"	197
3 lb. samples pease	"	203
3 lb. samples barley	"	98
Nuts, tree seeds and bulbs	"	396
		1,304

CORRESPONDENCE.

Letters received	3,328
Letters despatched	3,051

GARDEN VEGETABLES.

Beets.—Sown April 14.

Early Blood Turnip. Fit for table July 10. Crisp and sweet, very good.

Egyptian. Fit for table July 14. Very smooth roots, very crisp, dark blood red, sweet.

Nuttings Dwarf Improved. Fit for table July 18. A fine flavoured, sweet, good beet.

Long Smooth Blood Red. Fit for table September. A little stringy owing to the very dry August, not of first quality.

Table Turnips.—Sown April 14.

Extra Early White Milan. A very rapid grower and very sweet, fine flavoured, one of the best for summer use. Fit for table June 2.

Early Stone. Fit for table June 4. Sweet, crisp and good, very even in size.

Early White Strap-leaved. Fit for table June 6 Crisp, of fine flavour, roots very smooth.

Robertson's Golden Ball. Fit for table July 8. Flavour pleasant, solid, good.

Radishes.—Sown April 2.

Earliest Deep Scarlet Turnip. Fit for table May 9. Small, round, crisp, sweet.

Rosy Gem. Fit for table May 9. Very round, smooth, crisp, sweet, fine flavour, good.

Early Scarlet Turnip. White tip. Fit for table May 12. Crisp and sweet.

LETTUCE.—Sown April 7.

Paris White Cos. Fit for table July 16. Very fine flavour. Crisp and sweet.

Cabbage, Big Boston. Fit for table May 18. Sweet, crisp and of fine flavour.

Toronto Gem. Fit for table May 18. Forms a fine solid, crisp, white head of very superior quality.

GARDEN PEASE.—Sown April 16.

Rennie's Best Extra Early. Fit for table June 17. Pod of medium length, averaging six to eight fair size pease of fine quality. Straw 20 to 24 inches long and well loaded.

Thos. Laxton. Fit for table June 22. Pod of medium length, well filled with medium size pease of very superior flavour and quality. Straw 24 to 26 inches long and well loaded with pease.

Rennie's Queen. Fit for table June 28. Pods long and fairly well filled, pea large and very sweet and rich flavoured. Straw 24 to 30 inches and well loaded.

Gradus. Fit for table June 29. Pods long and well filled. Pea large and of the best quality, rich and good. Straw 24 to 32 inches and fairly well loaded.

Dwarf Champion. Fit for table July 8. Pods of medium length and filled out to tip with medium to large pease of very fine quality. Straw 24 to 30 inches long and well loaded with pods.

Horsford's Market Garden. Fit for table July 8. Pods of medium length, pea large and of very fine quality. Straw 24 to 28 inches long and very well loaded with pods.

BEANS.—Planted April 16.

Extra Early Valentine. Fit for table June 18. Pods about 5 inches long, round and plump, of very fine quality. Very productive.

Dwarf Black Speckled. Fit for table June 24. Pods 2 to 4 inches long and rather slender. Plants small and not productive. Ripens very soon after becoming fit for table.

Dwarf Golden Skinless. Fit for table July 6. Plant vigorous and moderately productive, pods 3 to 4 inches, very crisp and of fine quality.

Dwarf Emperor of Russia. Fit for table July 8. A vigorous grower and productive. Pods 4 to 5 inches, plump, crisp and good.

New Round Red Kidney. Fit for table July 8. Plant fairly vigorous and productive. Pods 3 to 5 inches long, round, plump, crisp, remains fit for table a long time, of good flavour.

Prolific Golden Wax. Fit for table July 12. Plants vigorous and moderately productive. Pods 2½ to 5 inches long, plump, crisp and of very fine flavour.

Saddle Back Wax.—Fit for table July 14. Plants vigorous, moderately productive. Pods 3 to 6 inches long, plump, crisp and of very fine quality.

Fame of Vitry. Fit for table July 20. Plants vigorous and productive. Pods 3½ to 6 inches long, crisp with a mild, pleasant flavour.

Dwarf Matchless. Fit for table July 20. Plants dwarf, but fairly productive. Pods 3 to 6 inches long, crisp and of fine flavour, but ripen very soon after becoming fit for table.

Dwarf Wax Every Day. Fit for table July 23. Plants very dwarf and not very productive. Pods 2 to 4 inches long, crisp and of very pleasant flavour.

Stringless Green Pod. Fit for table July 23. Plants vigorous and productive. Pods 4 to 6 inches long, plump, crisp, and of very fine quality.

PARSNIPS.—Sown April 26.

Hollow Crown. Very strong grower and large, very sweet and of fine flavour in winter.

Sutton's Student. Short medium size roots. Fit for table in August. When partly grown, have a very pleasant flavour.

CABBAGE.

Seed sown in beds in open garden on April 10, and plants transplanted May 25.

Express. Fit for table July 7. Heads small, solid, crisp, sweet with a pleasant flavour. Plants very regular headers.

Early Jersey Wakefield. Fit for table July 7. Heads of medium size, very solid and hard, crisp, of very fine flavour, and an even, regular header.

Paris Market. Fit for table July 8. Heads of fair size, firm and solid, very crisp with a delicate flavour.

Extra Early Midsummer Savoy. Fit for table July 14. Heads round, of medium size, rather soft, but the quality is very good.

Early Winningstadt. Fit for table August 8. Heads solid, firm, crisp, and of very fine quality.

Fottler's Improved Brunswick. Fit for table September 3. Heads large, solid, very uniform, a splendid cropper, crisp, very sweet with a mild, pleasant flavour.

Green Globe Savoy. Fit for table September 3. Heads of medium size, round, very firm and solid, with a very fine flavour.

Large Late Flat Drumhead. Heads very uniformly large, flat, firm and solid, a splendid cropper, and a superior winter cabbage.

CAULIFLOWER.

Seed sown in open ground April 10, and transplanted May 20.

Selected Extra Early Dwarf Erfurt. Fit for table July 14. Heads small, compact, snow white, very crisp, sweet, pleasant, very good.

Early Snowball. Fit for table July 18. Heads fine size, very close and compact, very white, crisp, sweet, with a delicate, fine flavour; very good.

Early Paris. Fit for table July 22. Heads small, close, fairly compact, and of very good flavour.

BRUSSELS SPROUTS.

Sown in the open April 10, transplanted May 20.

Giant. A tall vigorous grower and very productive, of fine quality.

BROCCOLI.

Walcheren. Fit for table July 29. Heads large, compact, very white, crisp, with a very fine flavour.

CORN.

Planted in hills 36 inches apart each way May 10, on a warm sandy loam.

Premo. A strong grower and productive; ears 4 to 6 inches long and closely filled out to tip. Fit for table August 16. Corn sweet, tender, of very fine quality, and remains fit for table a long time.

Ringleader. Fit for use August 16. Ears 4 to 6 inches long and well filled out over the tip; kernels large, very tender and sweet, a strong grower and productive.

Early Windsor. Fit for table August 22. Ears 3 to 6 inches long and well filled to tip. Very sweet and tender; stalks fairly vigorous and productive.

Extra Early White Cory. Fit for use August 22. Ears 3 to 5 inches long, well filled, grains deep, tender, very sweet and good; stalks productive and of vigorous growth.

TABLE CARROTS.—Sown April 2.

French Horn. Fit for table June 8. Small, crisp, sweet, very good.

Luc Half Long. Fit for table June 28. Crisp, very sweet and pleasant.

Early Scarlet Horn. Fit for table June 28. Crisp, short, plump; roots of very pleasant flavour.

ONIONS.—Sown April 14.

Large Red Wethersfield. Large, very solid and close-grained, even in size, and productive; of very fine quality and a good keeper.

Trebon's Large Yellow. Medium to large, solid, very mild, sweet; does not bottom and ripens unevenly in this climate.

Market Favourite. Medium or below in size, even and a good regular stand, solid, mild and sweet; a very good keeper.

Danver's Yellow Globe. Large globe shape and very uniform in size; a fine cropper, and of very good quality; a good keeper.

PUMPKINS.—Planted May 12.

Quaker Pie. Vines strong growers and productive. Pumpkin of medium size and oval shape, with a yellow skin and flesh which is thick.

Japanese Pie. Vines of medium growth, not productive. Fruit medium or below in size; flesh very thick, not valuable.

Jumbo. Vines very strong growers, and productive.

Mammoth. Vines very strong growers; pumpkins very large and coarse.

Large Field. Vines vigorous and productive; pumpkins large, oval, with a yellow skin; a good keeper.

Large Cheese. Vines strong growers and productive; pumpkin of fine size, yellow skin; good quality.

Golden Oblong. Vines moderately vigorous and moderately productive; fruit of medium size, oval, with golden skin; a good keeper.

Sugar. Vines fairly vigorous; pumpkin small, but of fine quality for table use.

SQUASH.

White Bush Scalloped. Vines bushy and very productive; squash 4 to 6 inches in diameter and of very good quality. Fit for use August 4.

Giant Crookneck. Vines vigorous and productive; squash fit for use August 4; of very fine flavour and good quality.

Long White Bush Marrow. Vines bushy and productive; fruits large, 12 to 14 inches long; creamy yellow with thick flesh and very fair flavour and quality. Fit for table August 26.

Perfect Gem. Vines very long and productive; squash globular; flesh thick and of very fine flavour; a good keeper.

Essex Hybrid. Vines strong growers and moderately productive; squash thick fleshed and of fair quality.

Early Yellow Bush Scalloped. The only difference between this and the white variety of same name is the colour of the skin.

Fordhook. Vines strong growers and productive; squash 9 to 12 inches long; flesh thick and very sweet and dry; an excellent keeper.

Faxon. A strong grower and moderately productive; squash medium in size, very thick fleshed; cooks dry and sweet.

Crookneck. Vines bushy and productive.

English Vegetable Marrow. Vines vigorous and productive; fruit from 12 to 18 inches long, greenish yellow, and of fair quality.

Boston Marrow. Vines vigorous growers and moderately productive; fruit 14 to 18 inches long, of fair quality and a fair winter keeper.

Orange Marrow. Vines strong growers and productive; squash of medium size, thick fleshed and of fine flavour.

Mammoth Green. Vines very strong growers and squash very large.

Hubbard, Golden Hubbard, and Warted Hubbard are pretty much the same in character of growth and are all excellent table squash, being dry and very sweet. They are good winter keepers.

Golden Bronze. Vines vigorous and productive; squash of medium size, very thick fleshed, and when cooked the flesh is dry, sweet and of very fine flavour.

Delicious. Vine very productive; squash of medium size, very thick fleshed, and when cooked, of very superior table quality. This also is a good keeper.

APPLES.

The spring was unfavourable in this district for the apples, as well as all the other large fruits which blossom about the same time, as there were continued cold, showery days and on several occasions the temperature went down very nearly to, and on one occasion did reach the freezing point. Fortunately these weather conditions were not very general, and the frost only struck patches here and there.

The following varieties fruited this year, and there are among them several winter varieties which give promise of being valuable.

1. *William Gladstone.*—Tree a strong grower. Fruit of medium size, oval, somewhat conical; stem of medium length; cavity deep and narrow; calyx small, open, basin narrow, shallow and somewhat ribbed; skin clear yellow, almost covered with dull deep red. Flesh whitish, not juicy, mildly sub-acid with a pleasant flavour. Season last of July.

2. *Throne.*—Tree a strong vigorous grower. Fruit large, oblong, conical, ribbed; stem short; cavity narrow and deep; calyx moderately large, closed, basin narrow, deep, and ribbed; skin dull yellow; flesh whitish, juicy, firm, mildly acid. Watercores on the tree before it is ripe. Season August.

3. *Summer Golden Pippin.*—Tree a slow grower. Fruit small, roundish, flattened; stem long, slender; cavity narrow and moderately deep; calyx small, closed; basin wide and shallow; skin clear golden yellow, with sometimes a little orange red in the sun; flesh yellowish, firm, crisp, juicy, with a very pleasant flavour, mildly acid; very good, but too small. Season all of August.

4. *Anisette.*—Very similar in character of tree growth and fruit, to Duchess of Oldenburgh.

5. *Dwyer.*—Tree a poor grower and a very moderate producer. Fruit only medium in size, roundish; stem of medium length; cavity medium in depth, round; calyx small, closed; basin moderately deep and wide, wrinkled; skin greenish yellow with a few dark specks; flesh whitish, tender, juicy, a mild pleasant acid, with a fine flavour. Season September.

6. *Schabach Alma.*—Tree a moderate grower. Fruit large, oblong conical, tapering sharply to the eye; stem short; cavity narrow, moderately deep, round, russeted about the stem; skin yellow, nearly overspread with light pale red; flesh whitish, firm, fine-grained, juicy, a mild, pleasant acid. Season October and first half of November.

7. *Rolland.*—Tree a medium grower. Fruit large, roundish, flattened at stem and eye; stem of medium length; cavity wide and deep; calyx large, closed; basin moderately large, and wide; skin yellow with a few splashes of red on the sunny side; flesh white, firm, crisp, juicy, with a mild pleasant flavour; sub-acid. Season October to December.

8. *Nelson Codlin.*—Tree a fair grower. Fruit of medium size, roundish oblong; stem short and stout; cavity small; calyx small, closed; basin wide and shallow; skin pale greenish-yellow, with russet dots; flesh yellowish white, juicy, fine-grained, tender, briskly acid, with a pleasant flavour; a good cooking apple. Season October.

9. *Fox Whelp.*—Tree a poor grower. Fruit of medium size or below, roundish; stem long and slender; cavity narrow and shallow; calyx small, closed; basin narrow, shallow, and ribbed; skin yellow, streaked with red on the sunny side; flesh firm, juicy, mildly sub-acid. Season October to November.

10. *Mosher Sweet.*—Tree only a moderate grower. Fruit of medium size, conical, angular and often ribbed; stem medium in length, stout; cavity wide and deep; calyx large, closed; basin narrow, deep, and ribbed; skin greenish-yellow; flesh white, fine-grained, moderately juicy, sweet with a rich aromatic flavour. Season October.

11. *Princess Louise.*—Tree a fair grower. Fruit below medium size, roundish; stem medium in length, slender; cavity wide and shallow; calyx of medium size, closed; basin of medium width, wrinkled; skin pale yellow with sometimes a reddish blush; flesh white, tender, fine-grained, crisp, very juicy, mildly sub-acid, with a fine flavour. Season October and November.

12. *Ananas Rouge.*—Tree a strong grower. Fruit medium in size or above, roundish; stem long; cavity deep and wide; calyx medium to large, open; basin small and narrow; skin yellow, with a few streaks and splashes of bright red; flesh white, fine-grained, tender, juicy, mild, sub-acid, with a very pleasant flavour. Season October.

13. *Coles Quince.*—Tree a vigorous grower. Fruit medium in size or above medium, oblate, roundish; stem short; cavity deep and wide; calyx of medium size, closed; basin deep, wide, and furrowed; skin dull yellow, with sometimes a small blush; flesh yellowish, juicy, rather coarse-grained, crisp, sub-acid, with a very pleasant flavour. Season October and November.

14. *Emperor William.*—Tree a feeble grower. Fruit of medium size or below, oblate, roundish; stem short; cavity deep and wide; calyx large, open; basin wide and shallow; skin russet yellow with a bright red cheek; flesh yellowish, moderately juicy, plump at first, but inclined to wither, of a mild, pleasant sub-acid character. Season November and December.

15. *Mannington Pearmain.*—Tree a vigorous grower. Fruit small, roundish, oblong, conical; stem long, slender; cavity of medium depth, and wide; calyx small, closed; basin wide and shallow; skin clear yellow, with a little red on the sunny side, a little russet in patches and a few gray dots; flesh yellowish, crisp, fine-grained, fairly juicy, pleasantly sub-acid with a fine flavour. October and November.

16. *Anne Elizabeth.*—Tree a moderate grower. Fruit large, globular; stem short, slender; cavity narrow and deep; calyx large, open; basin deep, narrow and corrugated; skin russet green with a dull red cheek; flesh greenish white, a little coarse, juicy, firm, mildly acid, not of high quality. Season November.

17. *Cusset.*—Tree a feeble grower. Fruit medium in size, roundish, conical; stem short; cavity deep, pointed; calyx of medium size, closed; basin small and corrugated; skin dull greenish-yellow; flesh white, fine-grained, not juicy, mildly sub-acid; not valuable. Season November and December.

18. *Etoilee.*—Tree a moderately strong grower. Fruit below medium size, globular, conical; stem long, slender; cavity deep and narrow, with traces of green and red in cavity; calyx large, partly open; basin wide, shallow and corrugated; skin yellow, marbled with green; flesh yellowish, firm, crisp, moderately juicy, mild and pleasantly acid, nearly sweet. Season November and December.

19. *De La Rouarie.*—Tree a strong grower. Fruit medium in size, oblate, ribbed; stem short; cavity narrow and deep; calyx large, closed; basin narrow and shallow; skin a bright handsome russet; flesh yellowish, fine-grained, crisp, moderately juicy, mildly sub-acid, with fine flavour. Season November and December.

20. *Lyman's Pumpkin Sweet.*—Tree a strong and upright grower. Fruit large, roundish, inclined to conical; stem short, stout; cavity moderately deep and wide; calyx large, open; basin narrow and moderately deep, wrinkled; skin greenish yellow, with sometimes a little dull colour on the sunny side, and many whitish dots; flesh whitish, firm, not fine-grained, not very crisp or juicy, very sweet. Season November and December.

21. *Harts Seedling.* Tree a strong grower. Fruit above medium in size, roundish, oblate; stem of medium length, slender; cavity, narrow and deep; calyx small, partly open; basin wide and deep; skin dull greenish-yellow, with a little russet about the stem, and a few gray dots, and sometimes an orange yellow blush on the sunny side; flesh greenish-white, firm, crisp, moderately juicy, mildly acid with a pleasant flavour. Season November and December.

22. *Frazer's No. 1.*—Tree only a moderate grower. Fruit medium to large, oblate, flattened; stem long and slender; cavity deep and wide; calyx of medium size, open, shallow and small, skin yellow, freely splashed and shaded with two shades of red; flesh white, breaking firm, not very juicy, nearly sweet. Season November and December.

23. *Marion County Red.*—Tree a strong grower. Fruit above medium size, roundish, conical; stem long; cavity small and shallow; calyx large and open; basin wide and shallow; skin dull yellowish-green, with a brownish-red blush; flesh greenish-white, firm, not juicy, mildly acid, not of much value. Season November and December.

24. *Rome Beauty.*—Tree a strong grower. Fruit above medium size, roundish, slightly conical; stem long; cavity wide and deep; calyx partly open; basin moderately narrow and deep; skin yellow, splashed with bright red, and a few light dots with sometimes russet about the stem; flesh yellowish, crisp, tender, juicy, mildly acid. Season November and December.

25. *Christie's Pippin.*- Tree a moderate grower. Fruit medium in size or below, oblate; stem of medium length; cavity small; calyx small; basin narrow and shallow; skin fine, clear yellow, with sometimes a small blush and a few russet dots; flesh yellowish, crisp, moderately juicy, mildly sub-acid, with a rich fine flavour. Season November to March.

26. *Banana.*—Tree a fair grower. Fruit above medium size, oblate, conical, sometimes ribbed; stem of medium length; cavity wide and deep; calyx small, closed; basin narrow and shallow, wrinkled; skin clear, pale yellow, nearly covered with light red; flesh whitish, firm, a little coarse grained, crisp, tender, juicy, of a mild, pleasant sub-acid character with an aromatic flavour. Season November to January.

27. *Marshall Red.*—Tree a strong grower. Fruit of medium size, conical; stem short; cavity shallow; calyx small, closed; basin narrow and shallow, and plaited; skin yellow, nearly overspread with dull red; flesh whitish, crisp, moderately juicy, a little coarse, with a mild and pleasant sprightly acid character. Season November to January.

28. *Fremy.*—Tree a moderate grower. Fruit of medium size, oblate, globular, a little conical; stem medium in length; cavity deep and narrow; calyx small, closed, basin fairly large and deep; skin a yellowish-green; flesh greenish-white, firm, crisp, not juicy, mildly acid with a sweetish after taste. Season December and January.

29. *Forest No. 5.*—Tree a moderately strong grower. Fruit about medium size, conical; stem short; cavity narrow and deep; calyx small, partly open; basin narrow and shallow; skin greenish russet, with a brownish blush on the sunny side; flesh greenish-white, fine-grained, moderately juicy, rich, sweet, inclined to wither. Season December to March.

30. *Kossuth.*—Tree a strong grower. Fruit below medium size, roundish, oblate; stem of medium length; cavity wide and shallow; calyx small, closed; basin wide and

shallow; skin greenish-yellow, nearly overspread with pale, dull red, and sprinkled with yellow dots; flesh white, firm, fine-grained, juicy, pleasant, nearly sweet. Season December to February.

31. *Inkerman Greening.*—Tree a moderately strong grower. Fruit medium to large, conical; stem short; cavity narrow and deep; calyx small, open; basin narrow and deep; skin greenish-yellow sprinkled with light dots; flesh white, crisp, juicy, tender, fine-grained, mild and pleasantly acid. Season December and January.

32. *Hagloe Crab.*—Tree a poor grower. Fruit below medium size, irregularly oblate, conical; stem of medium length; cavity very narrow and shallow; calyx small, partly open; basin narrow and shallow; skin dull russet green, with many light dots; flesh greenish-white, moderately juicy, firm, crisp. Season December.

33. *New France.*—Tree a fair grower. Fruit medium or below in size, roundish oblate; stem short; cavity narrow and deep; calyx of medium size, open; basin wide and shallow; skin golden yellow with a bright red blush; flesh white, crisp, tender, fine-grained, mild and pleasantly acid. Season December and January.

34. *Jewell No. 39.*—Tree a free grower. Fruit of medium size, conical; stem of medium length; cavity medium in depth and width; calyx small, closed; basin narrow and deep; skin yellowish with a handsome red blush; flesh white, tender, crisp, juicy, pleasantly sub-acid. Season December.

35. *Pride of Washington.*—Tree a strong grower. Fruit below medium size, conical; stem long; cavity acute, deep and wide; calyx of medium width, closed; basin very shallow, and very small; skin dull yellow; flesh white, firm, not juicy, nearly sweet; of no value. Season December to March.

36. *Baron de Trautenburgh.*—Tree a strong grower. Fruit large, conical, somewhat ribbed and irregular; stem long; cavity deep and round; calyx small, closed; basin narrow and shallow, somewhat ribbed; skin greenish, with sometimes a russet-brown blush, and a few gray dots; flesh white, firm, fine-grained, moderately juicy, brisk and pleasantly acid. Season December to March.

37. *Coffelt Beauty.*—Tree a fair grower. Fruit below medium size, oblate, conical; stem long; cavity narrow and deep; calyx small, closed; basin small and shallow; skin russet-green, with a dull red cheek; flesh white, crisp, juicy, mildly sub-acid; not valuable. Season January and February.

38. *Galloway Pippin.*—Tree a strong grower. Fruit below medium size, roundish, somewhat ribbed; stem long; cavity narrow and deep, somewhat russeted; calyx small, closed; basin wide and shallow; skin dull yellowish-green, with a few grayish dots; flesh greenish-white, not juicy, mildly acid, a little tough or leathery. Season January to March. Not of value.

39. *Black Oxford.*—Tree a moderate grower. Fruit below medium size, roundish, slightly conical; stem long, slender; cavity narrow and deep; calyx small, closed; basin narrow and shallow; skin yellow, nearly overspread with red, and a few grayish dots; flesh whitish, firm, not juicy, mildly sub-acid. December to February. Not valuable.

40. *Balmer.*—Tree a strong spreading grower. Fruit small, oblong, conical; stem short; cavity narrow and deep; calyx small, closed; basin narrow and shallow; skin greenish-yellow, nearly overspread with dull red; flesh white, firm, crisp, not juicy, nearly sweet. Season December to February; of no value.

41. *Benton.*—Tree a strong and vigorous grower. Fruit below medium size, roundish, conical; stem short; cavity narrow and deep; calyx large, closed; basin narrow, moderately deep, and corrugated; skin greenish-yellow, with a small blush on the sunny side; flesh white, crisp, fairly juicy, mildly sub-acid. Season December and January. Too small to be of value.

42. *Burlington.*—Tree a strong grower. Fruit below medium in size, oblong, tapering slightly to the eye; stem long and slender; cavity deep, acute, wide, some-

times russeted; calyx small, closed; basin very deep and wide, ribbed; skin yellow, with splashes and dots of light red; flesh whitish, firm, juicy, mildly acid, or nearly sweet, not tender or fine-grained. Season December to January.

43. *Brownlee's Russet.*—Tree a strong grower. Fruit large, roundish, sometimes slightly conical: stem stout, short, often with a fleshy knob at the insertion; cavity narrow and deep; calyx closed, small and shallow; skin dull russet, with sometimes a dull red blush, and a few yellowish dots; flesh greenish, coarse, moderately juicy, aromatic sweet, very pleasant, but inclined to wither. Season December to February.

44. *Byford Wonder.*—Tree a strong grower. Fruit above medium, to large, roundish, oblate, conical; stem short; cavity narrow and deep; calyx small, closed; basin narrow and shallow; skin greenish-yellow with patches of bright red on the sunny side; flesh white, juicy, firm, sprightly with a pleasant flavour. Season December to February.

45. *Belle de Avrille.*—Tree a feeble grower. Fruit of medium size, oblate, slightly conical; stem slender, long; cavity narrow and deep; calyx large and open; basin wide and shallow; skin greenish-yellow, with a faint blush on the sunny side; flesh yellowish-white, fine-grained, crisp, juicy, pleasantly acid with a good flavour. Season December and January.

46. *American Blush.*—Tree a free grower. Fruit large, roundish, oblate; stem long; cavity of medium depth and width; calyx small, open; basin small and deep; skin dull greenish-russet, with sometimes a dull red blush; flesh greenish-white, juicy, firm, fine-grained, mild, nearly sweet. Season January to March.

47. *Delicious.*—Tree a free grower. Fruit of medium size, conical; stem rather long, cavity deep and wide; calyx large, closed; basin narrow, moderately deep, corrugated; skin greenish-yellow, with stripes of red; flesh whitish, juicy, firm, rather coarse-grained, mildly acid. Season January and February.

48. *Christmas Pearmain.*—Tree a strong grower. Fruit of medium size or below, oblate, conical; stem short; cavity narrow and shallow; calyx of medium size, closed; basin shallow and small; skin yellow, sometimes a few small stripes of pale red; flesh yellowish, fine-grained, firm, moderately juicy, mildly sub-acid, with a fine flavour. Season December to February.

49. *De Chataignier.*—Tree a strong grower. Fruit of medium size, roundish, oblate; stem of medium length; cavity fairly deep, and moderately wide; calyx small, closed; basin small and shallow; skin greenish-yellow, almost overspread with deep red; flesh white, tender, fine-grained, moderately firm, mild, pleasantly sub-acid, very good. Season December to March.

50. *Winter Fameuse.*—Tree a strong grower. Fruit medium or below medium in size, roundish conical; stem of medium length, and stout; cavity narrow and deep; calyx small, closed; basin narrow and shallow; skin greenish-yellow, with a blush in two shades of red; flesh white, tender, crisp, fine-grained, mildly sub-acid with a pleasant flavour. Season December to February.

51. *Withington Fillbasket.*—Tree a strong grower. Fruit of medium size, roundish slightly flattened; stem short, cavity shallow and wide; calyx small, closed; basin wide and shallow; skin green with many light dots; flesh greenish-white, fine-grained, crisp, pleasant and sprightly, with a good flavour. Season January to March.

52. *Souvenir d'Etichove.*—Tree a strong grower. Fruit below medium size, roundish, globular; stem of medium length, slender; cavity deep, wide and acute; calyx large, open; basin deep and wide; skin dull yellow, with a dull blush in the sun; flesh greenish-white, fine-grained, fairly juicy, a mild pleasant sub-acid, with a good flavour; apt to wither. Season December to February.

53. *Reinette de Lucas.*—Tree a strong grower. Fruit below medium size, oblate, slightly conical; stem short; cavity wide and shallow; calyx small, partly open; basin moderately deep and moderately wide, somewhat corrugated; skin greenish-

yellow, almost entirely overspread with deep red; flesh greenish-white, fine-grained, crisp, fairly juicy, mildly acid with a fine pleasant flavour. Season December to March.

54. *Shockley.*—Tree only a moderate grower. Fruit below medium size, roundish; stem long, slender; cavity deep and narrow; calyx small, open; basin, wide and shallow; skin greenish-yellow, with occasionally a dull red cheek; flesh yellowish-white, moderately juicy, not fine-grained, mildly acid. Season January to March.

55. *La Ligne Devillers.*—Tree a moderately strong grower. Fruit of medium size, roundish, conical; stem medium in length; cavity deep and wide and russeted; calyx large and long, open; basin narrow and small; skin yellow, freely splashed and striped with red in two shades; flesh white, fine-grained, juicy, crisp, mildly and pleasantly acid. Season January to March.

56. *Pigeon de Jerusalem.*—Tree a moderate grower. Fruit medium or below in size, conical; stem medium in length, slender; cavity deep and fairly wide, acute and sometimes russeted; calyx small, partly open; basin narrow and shallow; skin dull russet-yellow, with a dull reddish blush and many yellow dots; flesh greenish-white, tender, fine-grained, mild and pleasantly acid, not juicy. Season January.

57. *Tobias Black.*—Tree a slow grower and very tardy in coming into bearing. Fruit of medium size, oblong, sometimes conical, ribbed; stem of medium length; cavity wide, deep, acute; calyx medium in size, closed; basin deep and wide; skin greenish, with a dull red blush and a few gray dots; flesh yellowish, fine-grained, crisp, firm, moderately juicy, nearly sweet. Season December to February.

58. *Virginia Greening.*—Tree a moderate grower. Fruit large, oblate; stem long; cavity wide and deep; calyx large, open; basin deep and medium wide; skin yellowish-green, with many brown dots; flesh yellowish, firm, fine-grained, pleasantly sub-acid. Season December to February.

59.—*Whinnery's Red.*—Tree a fair grower. Fruit of medium size, roundish, conical; stem medium in length; cavity of medium width and shallow; calyx small, closed; basin wide and shallow; skin yellowish, nearly covered with crimson; flesh white, firm, only moderately juicy, mildly sub-acid. Season January to March.

60. *May Queen.*—Tree a strong grower. Fruit small, roundish conical; stem long and slender; cavity narrow and deep; calyx of medium width, partly open; basin very shallow and narrow; skin dull yellow, with a little russet about the stem, and sometimes a dull orange blush; flesh whitish, not juicy, not tender, nearly sweet, not of any value. Season January to March.

PEARS.

The same causes which injured the crop of other fruits affected the pears, and some varieties which blossomed very freely, bore either no crop, or very few specimens, but as in the case of other fruits, the bright dry summer weather lessened the injury from fundous pests and gave a handsomer finish to the fruit. The following varieties fruited for the first time this season, and are listed in the order of their ripening.

Beurre Leon Rey.—Tree a feeble grower. Fruit of medium size, roundish pyriform; stem of medium length, slender; calyx large; basin broad, shallow; skin yellowish russet with sometimes a bronze reddish blush; flesh yellowish, juicy, very fine-grained, tender, pleasant, almost sweet. Season last of August.

Marie Louise.—Tree a strong straggling grower. Fruit above medium size, oblong, pyriform, irregular in shape; stem of medium length, set obliquely; skin a clear golden yellow, with patches of russet; flesh white, very juicy, buttery, with a rich sweet flavour. Season September and October.

Bronze Duchess.—Tree a moderate grower. Fruit of medium size, oblong, pear shape; stem long, slender, curved; cavity wide and shallow; basin small; skin russet with a dull red russet cheek; flesh yellowish, juicy, vinous, slightly astringent. Season September.

Brockworth Park.—Tree a strong grower. Fruit medium to large, obtuse pyriform; stem short, stout; calyx small, closed; basin shallow; skin smooth, yellow with a faint blush, sometimes red streaks on sunny side; flesh white, buttery, melting, juicy, with a fine rich flavour. Season late September and October.

Bon Vicaire.—Tree a strong and upright grower. Fruit large, oblong, pyriform; stem one inch long and set obliquely, often with a fleshy protuberance at one side; calyx medium to small, closed; basin narrow and moderately deep; skin clear yellowish green, with patches of russet, and a bright red cheek in the sun, and many grayish dots; flesh whitish, buttery, melting, juicy, sweet, with a rich flavour. Season first half of October.

Two Sisters.—Tree a vigorous grower. Fruit of medium size or below, oblong, irregular in shape; stem short; cavity small and shallow; calyx large and open; skin greenish yellow, with a few brown dots; flesh yellowish-white, a little coarse, juicy, sweet, not buttery, nor of high quality. Season October.

Sarah.—Tree a moderately strong, upright grower. Fruit below medium size, roundish, pyriform; stem of medium length, in a slight depression, with a ring; calyx small, closed; basin shallow; skin greenish-yellow, patched with russet and many brown dots; flesh white, fine-grained, juicy, melting, sweet, and aromatic. Season October.

Onondaga.—Tree a strong grower. Fruit large, obovate, obtuse, pyriform; stem of medium length, stout; cavity small; stem set at an angle; calyx small, closed; skin somewhat rough, with many russet dots of a fine yellow colour, sometimes with a red cheek; flesh yellowish, buttery, juicy, with a fine flavour. Season October and November.

Anna Audisson.—Tree a fair grower. Fruit of medium size, roundish, obtuse, pyriform; stem short and stout; cavity small; calyx medium and open; skin greenish-yellow, with a reddish blush; flesh whitish, juicy, melting, sweet, with a pleasant flavour. Season October.

Ellis.—Tree a strong grower. Fruit large, obtuse pyriform; stem medium length and stout; cavity small; calyx moderately large, open; basin shallow and uneven; skin greenish-yellow, patched with russet and many russet dots, and sometimes a slight blush; flesh whitish, juicy, melting, sweet and aromatic. Season last of September and October.

Angelique Leclerc.—Tree a fair grower. Fruit of medium size, oblong, pyriform; stem short and stout; calyx small, open; skin greenish-yellow, with a little red in the sun; flesh white, fine-grained, juicy, sweet, a little gritty at the core. Season October and November.

Louise Bon Sannier.—Tree a strong grower. Fruit small, obtuse, pyriform, stem of medium length, slender; cavity small; calyx moderately open; basin narrow and shallow; skin russet yellow; flesh yellowish, fairly juicy, with a pleasant vinous flavour. Season November and December.

St. Joachim.—Tree a strong and upright grower. Fruit of medium size, or above, obtuse, pyriform; stem short and stout, with a fleshy protuberance at one side; calyx small and closed; basin wide and moderately deep; skin russet-yellow, sprinkled with many gray dots; flesh not tender nor juicy; not desirable. November and December.

Alexandrine Doullard.—Tree a vigorous grower. Fruit above medium size, obovate, obtuse, pyriform; stem of medium length; cavity small; calyx of medium size and partly closed; skin whitish-yellow, with veins and patches of russet; flesh white, juicy, melting, vinous. Season October and November.

Lewis (Dix).—Tree a vigorous grower. Fruit large, long, pyriform; stem short and stout, set obliquely; calyx small; basin narrow and flat; skin golden-yellow, with russet dots, and small patches of russet near the stem; flesh a little coarse, juicy, sweet, with a very fine flavour, perfumed. Season November.

Out of all the pears which have fruited at Agassiz for a number of years past, the following are the most productive and valuable from a commercial point of view: Dearborn Seedling, Marguerite, Dr. Jules Guyot, Bartlett, Emile de Heyst, La France, Beurre Bosc, Durondeau, Clairgeau, Howell, Vicar of Winkfield, and for a very late winter pear, the Monarch.

PLUMS.

The spring was unfavourable for the plum crop as it was cold and rainy during most of the blossoming period, and a light frost did a good deal of harm in some localities. Later on the weather improved, as also did the prospects of a crop, and the almost entire absence of rot this season, and bright warm weather during the ripening period contributed to the development of a very fine sample. The following sorts fruited this year for the first time in the farm orchards.

Grosse Tardive.—Tree a moderate grower. Fruit small, roundish, oval; stem 1¼ inch long, in a slight basin; apex a very small dent; skin deep purple red; flesh pale straw-yellow, juicy, tender, pleasant, sprightly. Ripe July 18.

Rupert.—Tree a moderate spreading grower. Fruit smooth, round, small; stem one inch long, in a small round basin; suture very shallow, almost indistinct, terminating in a dent; skin dull purple-red; flesh yellowish, juicy, sprightly, acid. Ripens unevenly from first to third week in July.

Mirabelle de Flotu.—Tree a strong grower. Fruit below medium size, oval; stem ¾ inch long, set in a shallow cavity; suture only a line, terminating in a slight depression, one side a little enlarged; skin a handsome yellow; flesh pale yellow, firm, juicy, sprightly, pleasant; stone small, roundish, free. Ripe July 21.

Red June.—Tree a strong grower. Fruit of medium size, roundish, pointed or heart-shaped; stem short; cavity small; suture shallow; skin orange, nearly covered with red; flesh yellow, tender, moderately juicy, mildly acid with a pleasant flavour. Ripens first half of August; ripening unevenly from August 6 to August 18. Much of the fruit fell off before attaining full size.

Dry's Seedling.—Tree a fair grower. Fruit above medium in size, roundish; stem of medium length; cavity of medium size; suture well marked, terminating in a slight basin; skin greenish-yellow; flesh yellowish, tender, juicy, sweet, with a very pleasant flavour. Season second week in August.

Prince's Red Gage.—Tree a strong upright grower. Fruit medium to large, round, flattened at both ends; stem ¾ inch long; cavity small, round; suture distinct, ending in a small basin; skin of a clear, handsome red; flesh yellowish, sweet, moderately juicy, with a very pleasant flavour; stone of medium size, a cling. Season second week in August.

Catherine (Blue).—Tree a moderate grower. Fruit of medium size, oval, tapering towards the stem, which is ¾ of an inch long; no cavity; suture indistinct; skin purple, with a bluish bloom; Flesh tender, juicy, greenish, sweet; stone a cling, which is large for the size of the plum. Season second week in August.

Furst's Early Damson.—Tree a slow grower. Fruit of medium size for a damson, oval; stem short; cavity small; skin dark purple, with a heavy blue bloom; flesh yellowish, moderately juicy, pleasantly sweet; stone small and free. Season second week in August.

Late Muscatelle.—Tree a moderate grower; fruit small, round, flattened at both ends; stem ¾ of an inch long; cavity small; suture shallow, ending in a dent; skin light purple, with a bluish bloom; flesh greenish-yellow, juicy, sweet, fine-grained, with a pleasant flavour. Season third week in August.

Meroldt's Reine Claude.—Tree a strong grower. Fruit below medium size, roundish, flattened at both ends; stem ¾ of an inch long; cavity small; suture a line terminating in a dent; skin yellowish-green, with a thin whitish bloom; flesh yellowish white, juicy, sweet, with a very fine flavour. Ripe third week in August.

Giant Prune.—Tree a strong grower. Fruit above medium size, oval; stem short; cavity small; suture well marked; skin yellow, nearly covered with red, and sprinkled with large purple dots; flesh yellowish, not sweet, rather dry and insipid. Season third week in August.

Precoce de Cullengen Prune.—Tree a feeble grower. Fruit small, oval, tapering a little towards the stem and apex; stem short; suture only a line; skin dark purple with a bluish bloom; flesh greenish, not juicy, sweet, with a fine flavour. Season middle to last of August.

Rivers' Tardive.—Tree a strong grower. Fruit below medium size, roundish; stem short, about half an inch long; cavity shallow; suture shallow, one side enlarged; skin reddish-purple, with a light bluish bloom; flesh yellow, firm, not very juicy, but of a pleasant flavour; stone small, nearly free. Season middle of August.

Baker Prune.—Tree a slow grower. Fruit below medium size, oval, tapering to the stem; stem three-quarters of an inch long; cavity shallow; suture very shallow, one side enlarged a little; skin dark purple, with a thick blue bloom; flesh yellowish, moderately juicy, sweet, with a pleasant flavour; stone below medium in size and free. Season August 16 to 24.

St. Lawrence.—Tree a strong grower. Fruit above medium size, almost heart-shape; stem short; cavity small, round; suture well defined, one side enlarged; skin bright purple, with a thin blue bloom; flesh yellowish, tender, juicy and sweet, with a fine flavour. Season third week in August.

Jaune Tardive.—Tree only a moderate grower. Fruit small, tapering to apex; stem of medium length; cavity shallow and small; suture only a line ending in a small basin; skin dull yellow; flesh yellow, juicy, sweet, tender. Season middle of August.

The Seigneur.—Tree a vigorous grower. Fruit small, round; stem short; cavity small; suture well marked, ending in a small round basin; skin nearly black with a thin bluish bloom; flesh yellowish, moderately juicy, not very sweet, with a pleasant flavour. Season middle of August.

Prune de Delices.—Tree a strong grower. Fruit of medium size, roundish, oval; stem short; cavity small; suture yellow; skin greenish-yellow splashed with red on sunny side; flesh greenish-yellow, juicy, sweet, with a very pleasant flavour. Season middle to latter part of August.

Boddaert's Reine Claude.—Tree a moderate grower. Fruit medium to large, roundish, oval; stem medium in length; cavity small; suture indistinct or nearly so, terminating in a dot; skin pale greenish-yellow, with a thin white bloom; flesh yellow, tender, juicy, sweet, with a fine rich flavour. Season third week in August.

Belle de Schoemberg.—Tree a strong grower. Fruit of medium size, roundish, oval; stem short; suture well marked; skin yellowish with a handsome blush; flesh yellow, sweet; not juicy but of a pleasant flavour; stone small and free. Season middle of August.

Pacific Prune.—Tree a strong grower. Fruit medium to large, oval; stem short; cavity small; suture distinct, one side enlarged; skin deep purple, with a bluish bloom; flesh yellowish, moderately juicy, sweet. with a fine flavour. Season middle of August.

Bingham.—Tree a strong grower. Fruit large, oblong, tapering from stalk to apex; stem short; cavity small; suture indistinct; skin clear yellow, mottled with clear red on the sunny side; flesh yellowish, juicy, with a fine rich flavour, stone large and a cling. Season middle of August.

Precoce de Lucas.—Tree a strong grower. Fruit small, oval, tapering to a point; stem of medium length; cavity small; suture indistinct; skin blue with a whitish bloom; flesh greenish-yellow, sweet, juicy, with a fine rich flavour. Season middle of August.

Monsieur.—Tree a strong grower. Fruit medium to large, oblong, oval; stem of medium length; cavity medium; suture well marked, one side enlarged; skin reddish purple, with a bluish bloom; flesh greenish-yellow, firm, juicy, moderately sweet, with a pleasant flavour. Season middle of August.

Virginale Blanche.—Tree a strong grower. Fruit of medium size, or below, roundish; stem short; no cavity; suture a line; skin greenish-white, with a white bloom, flesh greenish, juicy, moderately sweet, with a pleasant flavour; stone small and a cling. Season middle of August.

Eugene Furst.—Tree a strong grower. Fruit small, oval; stem short; suture a line; skin purple black, with a heavy bluish bloom; flesh greenish-yellow, juicy, sweet, with a fine rich flavour; stone large and adheres at one edge. Season middle of August.

Reine Claude.—Tree a strong grower. Fruit of medium size, roundish; stem of medium length; cavity small; suture a line ending in a small round basin; skin greenish-yellow, sometimes a reddish-blush; flesh yellowish, juicy, sweet, tender, with a fine rich flavour. Season middle to last of August.

De Gondin.—Tree a strong grower. Fruit of medium size, globular; stem short; cavity medium; suture a line; skin greenish-yellow, nearly overspread with light purple, with a thin bluish bloom; flesh yellowish, juicy, tender, sweet with a fine flavour. Season last of August.

Monsieur Von Tardif.—Tree a strong grower. Fruit below medium size, roundish, oval; stem short; cavity small; suture very slight; skin greenish-purple, sprinkled with gray dots; flesh greenish-yellow, juicy, sprightly, not of high quality; stone small and a cling. Season last of August.

Admiral de Rigny.—Tree a strong grower. Fruit shows that in this case the above name is a synonym for Imperial Gage.

Golden Transparent.—Tree a strong grower. Fruit of medium size, globular; stem short; suture a line ending in small basin; skin greenish-yellow, streaked with orange; flesh yellowish, juicy, sweet, not high flavoured. Season late August.

Goutte d'Or Violette.—Tree a strong grower. Fruit medium to large; oval, with a slight neck; stem medium in length; suture well marked and extending three-quarters around the fruit, one side enlarged; skin a light reddish purple, freely sprinkled with brown dots, with a thin light blue bloom; flesh yellowish, juicy, sweet; stone large and a cling. Season late August.

Masu.—Tree a fair grower. Fruit below medium size, globular; suture a line ending in a dot; stem short; cavity very slight; skin dull red; flesh yellowish, juicy, sweet with a pleasant flavour; stone medium to large, adheres at one edge. Season middle of August. Like all the plums of its class, it blooms very freely, but brings a very small crop to maturity.

Defresne.—Tree a strong grower. Fruit below medium size, oval; stem short; cavity small, round; suture a line ending in a slight depression; skin nearly black, with a thin blue bloom; flesh yellowish, not juicy, sweet; stone long, slender and thin, a cling. Season early September; not desirable.

Coe's Violet.—Tree a strong grower. Fruit large, oblong, oval, tapering to the stem; stem of medium length; cavity small; suture well marked, extending past the apex with one side enlarged; skin pale, dull purple, with a whitish bloom; flesh yellowish, firm, and moderately juicy, fairly sweet, with a pleasant flavour; stone large, adheres a little at one edge. Season early September. A fine shipper and a good producer.

St. Martin.—Tree a strong grower. Fruit small, roundish; stem moderately short and stout; cavity small; suture distinct; skin light purplish-red, with a thin white bloom; flesh yellowish, firm, sprightly with a fine rich flavour; stone long, slender, nearly free. Season early October.

Of the very large number of plums which have been fruited here for a number of years the following varieties have proved to be freest from rot, good shippers, and the trees are vigorous growers and regularly productive.

Diamond.—Large, dark purple, late August.

Mallard.—Large, purple, early August.

Curlew.—Large, blue, early August.

Belgian Purple.—Large, purple, middle of August.

Coe's Golden Drop.—Large, yellow, September.

Washington.—Large, yellow, early August.

Sultan.—Large, deep red, early August.

Monarch.—Large, dark purple, September.

Prince of Wales.—Medium to large, purple, September.

Damas de Coue.—Large, yellow with red, late July.

Reine Claude d'Ecully.—Large, greenish yellow, late August.

Kirke.—Medium to large, purple, late August.

Italian Prune.—Medium to large, dark blue, late September.

Duane's Purple.—Large, purple, middle of August.

CHERRIES.

The cherry crop was a poor one this year owing to unfavourable weather in spring, when the trees were in bloom and again when the fruit was maturing and ripening, frequent showers with sunshine, causing the fruit to split and decay. The following varieties fruited for the first time this year:

Montmorency Brettoneau.—Tree a free grower. Fruit below medium size, roundish, oblate; stem long; cavity shallow, with a shallow basin at apex; skin light red; flesh yellowish, pleasant, juicy, tender, mildly acid, rather soft for shipping. Season middle of June.

Montmorency Pleureur.—Tree a feeble pendulous grower. Fruit of medium size, oval; stem very long, a very shallow cavity and a dot at apex; skin yellowish-red with bright red in small dots or spots on the sunny side; flesh yellowish, mildly acid, tender, juicy, with a pleasant flavour. Season third week in June.

Suesse Fruhe Weichsel.—Tree a slow grower. Fruit small, round, dark red; stem of medium length, inserted in a small cavity; flesh reddish, juice red, juicy, sprightly, pleasantly acid; too small for a commercial cherry. Season middle of June.

Plymouth Rock.—Tree a slow grower. Fruit above medium size, flattened, blunt, heart-shape; stem medium in length; skin yellowish-red with deep red dots; flesh yellowish-white, tender, juicy, mildly sweet with a pleasant flavour. Season early July.

Abbesse.—Tree a fairly good grower. Fruit of medium size, round; stem long; skin yellowish-red; flesh yellowish, juicy, tender, with a pleasant, sprightly flavour; stone very small. Season middle of July.

Orel No. 25.—Tree a free grower. Fruit below medium size, roundish; stem of medium length; cavity small, with a small depression at apex; colour yellowish-red; flesh yellowish, juicy, tender, sprightly, pleasantly acid when fully ripe. Season middle of July.

Nouvelle Royale.—Tree a moderate grower. Fruit large, roundish; stem of medium length; cavity shallow and flat; skin dark glossy red; flesh tender, juicy, mildly acid, almost sweet with a pleasant flavour. Season middle of July.

Bedford Prolific.—Tree a strong grower. Fruit above medium size, blunt, heart-shape; stem long; cavity wide and shallow; skin glossy black; flesh red, juice red, tender, juicy with a pleasant, sprightly flavour, sweet, good. Season middle of July.

COMMERCIAL ORCHARDS.

The varieties added to the commercial apple orchard this year are the Cox Orange Pippin and the Winter Banana. All the trees have made a very satisfactory growth and two of the Mother trees bore three very fine specimens each.

A beginning in a commercial pear and plum orchard will be made this spring; the trees are ordered and the land is prepared to begin planting just as soon as spring opens.

SMALL FRUITS, 1906.

This has not been a favourable year with us for small fruits. The long, hot, dry time at and before ripening, lessened the crop considerably. The blackberries, however, suffered the least and there was a good crop of fine berries of this class.

RED AND YELLOW RASPBERRIES.

We have 75 varieties of Red and Yellow Raspberries under test. The following are the most desirable.

Name.	Date of Ripening.	Growth of Plant.	Size of Fruit.	Quality.	Productiveness.
Phoenix	June 18	Vigorous	Large	Firm, good quality	Productive.
Pauline	" 22	"	"	Firm, good quality, continues long in bearing.	"
New Fastolf	" 23	"	"	Firm, good quality	"
Northumberland Fill Basket.	" 23	"	Very large	Firm, good quality, continues long in bearing.	"
Duke of Brabant	" 25	"	Large	Firm, good quality	"
All Summer	" 26	"	Large medium	Firm, good quality, continues long in bearing.	"
Lord Beaconsfield	" 27	"	"	Firm, good quality	"
Sarah	" 27	"	"	Firm, sweet, very good quality. The best flavoured berry we have.	"
Cuthbert	" 28	"	Large	Firm, good quality	"
R. B. White	" 28	"	Large medium	" "	"
French Vice President.	" 28	"	Very Large	Firm, good quality, continues long in bearing.	"
Golden Queen	" 24	"	Large	Firm, sweet, good quality	"
Large Yellow	" 28	"	"	" good quality	"

Besides the above, we have the following varieties, all of which, here, are lacking in one or more desirable qualities:—Battler's Giant, Paragon, Charles, Hornet, Carter's Prolific, Belle de Fontenay, Baumforth's Seedling, Muskingum, Turner, Franconia, Hudson River Antwerp, Thompson, White Antwerp, Columbia, Arnold's Hybrid, Red Herrenhauser, Sugar of Metz, Carleton, Empire, Sharpe, Muriel, Craig, Autumn Surprise, Knevit's Giant, La Mercier, Guinea, Garnet, Mary, Percy, Fastolf, Marlboro, Clarke, Heebner, Norwich Wonder, King, Chili, Garfield, Shaffer's Colossal, Queen Victoria, Sir John, Cariboo, Wild, Col. Wilder, Brinckle's Orange, Goliath, Lizzie, Millar, Minnie, Beehive, Spineless Yellow, Yellow Antwerp, Malta, Barnet, Lady Anne, Nonpareil, Billard's Perpetual, Prince of Wales, Champion, Crimson Beauty, and Hansel.

BLACK CAP RASPBERRIES.

There are nineteen varieties of Black Cap Raspberries under test. They suffered perhaps more than any other of the small fruits from the hot dry weather, as they require moisture as well as sunshine to do well. This year they dried up on the vine to a considerable extent.

The following are the best:—

Name.	Date of Ripening.	Growth of Plant.	Size of Fruit.	Quality.	Productiveness.
Nemaha	July 1.	Vigorous	Large	Good quality.	Productive.
Older	" 3.	"	Large medium	"	"
Palmer	" 3.	"	"	"	"
Mammoth Cluster.	" 3.	"	Large	"	"
Kansas	" 3.	"	Large medium	"	"
Gregg	" 5.	"	Large	"	"
Ada	" 5.	"	Medium	"	"
Progress	" 5.	"	"	"	"
Conrath	" 7.	"	"	"	"
Hopkins	" 7.	"	"	"	"

Other varieties under trial are:—Carman, Smith's Prolific, Cromwell, Lovett, American Yellow Cap, Jackson's May King, Progress, Early Ohio, Oregon Late.

BLACKBERRIES.

Of the 27 varieties of Blackberries under test, the following are the best here:—

Name.	Date of Ripening.	Growth of Plant.	Size of Fruit.	Quality.	Productiveness.
Early King.	July 10.	Vigorous	Large	Good quality	Productive.
Hansel	" 17.	"	Large medium	"	"
Eldorado	" 17.	"	Very large	Very good quality	Very productive.
Snyder	" 18.	"	Large medium	Good quality	Productive.
Stone's Hardy	" 18.	"	Large	"	"
Agawam	" 18.	"	Large medium	"	"
Taylor	" 18.	"	"	"	"
Erie	" 18.	"	Large	"	"
Early Cluster	" 18.	"	"	"	Very productive.
Maxwell	" 18.	"	"	"	Productive.
Ohmer	" 19.	"	"	"	"
Taylor's Prolific	" 20.	"	Medium	"	"
Lawton	" 22.	"	Large	"	"
Oregon Everbearing	Aug. 1 to Oct. 1	"	Large medium	Fairly good quality	Very productive.

Besides the above the following are also under trial:—Wilson's Early, Tecumseh, Kittatinny, Wilson Jr., Early Harvest, Crystal White, Gainor, Thompson's Mammoth, Lovett's Best, Child's Tree, Dallas and Brunton.

RED AND WHITE CURRANTS.

There are 41 varieties of Red and White currants under test. Of these the following are the best here:—

Name.	Date of Ripening.	Growth of Plant.	Size of Fruit.	Quality.	Productiveness.
Red Cherry	June 20	Vigorous	Large medium	Good quality	Productive.
London Red	20	"	"	"	"
Raby Castle	21	"	"	"	"
White Grape	21	"	Medium	"	"
La Fertile	21	"	Large medium	"	"
La Conde	22	"	"	"	"
Prince Albert	25	"	"	"	"
La Turinese	25	"	Medium	"	"
Eyatt's New	25	"	"	"	"
White Cherry	25	"	"	"	"
Gondoin Red	26	"	Large medium	"	"
Large White Brandenburg	27	"	Large	"	"
White Pearl	28	"	Medium	"	"
Victoria	28	"	"	"	"

Besides the above varieties, the following have been tested, but found less valuable:—White Transparent, White Gondoin, Red Dutch, Knights Early Red, North Star, New Red Dutch, White Dutch, Fay's Prolific, Moore's Ruby, Versailles, No. 51 (L.S.) Langstraubige, White Esperen, Rankin's Red, Large White Frauendorfer, Verrier's White, Chenonceau, De la Rochepoze, Ringens, Beauty of St. Giles, Champaigner, English Red, Rouge Admirable, Large Red, White Kaiser, White Imperial.

BLACK CURRANTS.

There are 44 varieties of Black Currants under test. Of these, the following have been found the best here:—

Name.	Date of Ripening.	Growth of Plant.	Size of Fruit.	Quality.	Productiveness.
Dominion	July 1	Vigorous	Large medium	Mild, good quality	Productive.
Merveille de la Gironde	1	"	"	Slightly acid, good quality	"
Middlesex	1	"	"	Mild, good quality	"
Prince of Wales	2	"	Large	Sweet, very good quality	"
Boskoop Giant	2	"	Very large	" " "	"
Black Naples	2	"	Large	Sweet, good quality	"
London	2	"	Medium	" "	"
Lee's Prolific	2	"	Large medium	Mild, good quality	"
Pearce	5	"	Medium	" "	"
Victoria	5	"	Large	Sweet, good quality	"
Climax	5	"	Medium	Mild, good quality	"

Besides the above, the following varieties have been tried, but they are not so desirable:—Lennox, Bang-up, Gewohnliche, Eclipse, Sterling, Kerry Perry, Ruler, Madoc, Kentish Hero, Ambrafarbige, Charmer, Beaudry, Ontario, Eagle, Lanark, Baldwin, Wood, Louise, Stuart, Kentville, Success, Star, Champion, Ethel, Parker, Monarch, Bella, Norton, Oxford, Climax, Orton, Henry.

METEOROLOGICAL RECORD.

Date of Highest Temperature.	Temperature.	Date of Lowest Temperature.	Temperature.	Rainfall.	Snowfall.	Sunshine.	
1905.				Inches.	Inches.	Hours.	Minutes.
December 27	57	December 20, 26	30	4·26	....	17	12
1906.							
January 31	56	January 20.	26	4·25	21	38	48
February 7, 11	68	February 9.	29	4·68	....	102	..
March 27.	69	March 13	23	2·04	....	125	30
April 29	81	April 12	30	2·04	....	167	42
May 2	82	May 7.	32	7·40	....	134	42
June 2, 24	84	June 29	38	6·40	....	165	06
July 3	98	July 25	45	2·36	....	294	42
August 16, 21	86	August 16, 27	40	1·04	....	228	..
September 14.	74	September 26.	37	6·32	....	117	18
October 8	74	October 19	32	9·18	....	78	36
November 4, 9	53	November 15	24	10·30	2	51	..
December 4	51	December 31	17	5·29	13	21	36
		Total	....	63·30	36	1,525	..
1907.							
January 21	50	January 15.	4	0·61	37	90	..
February 24	53	February 3.	8	5·30	6	74	54
March 26.	58	March 18	24	7·26	2	95	12
		Total	....	13·17	45	260	06

I have the honour to be, sir,
Your obedient servant,
THOS. A. SHARPE.

STATEMENT OF EXPENDITURE ON THE DOMINION EXPERIMENTAL FARMS, FROM JULY 1, 1906, TO MARCH 31, 1907.

CENTRAL EXPERIMENTAL FARM.

Live stock			$ 542 37
Feed for stock		$ 2,961 32	
Supplies from cereal division		270 77	
Grain screenings from grain distribution		535 12	
		$ 3,767 21	
LESS—Supplies to poultry division		326 08	
			3,441 13
Veterinary services and drugs			121 98
Seed, grain, trees, &c.			373 92
Implements, tools, hardware and supplies			617 69
Drainage and drain tiles			16 50
Manure and fertilizers for experimental plots and horticultural and cereal divisions			236 10
Travelling expenses			1,216 27
Exhibition expenses			809 20
Blacksmithing, harness supplies and repairs			813 80
Bee division			145 32
Wages: farm work, including salaries of officers in charge			3,541 76
Wages: care of stock, including salary of herdsman			2,930 83
Horticultural division, including salaries of officers in charge, also forestry			4,809 59
Poultry division, including salaries of officers in charge		$ 2,654 36	
Value of grain, &c., supplied by farm		326 08	
			2,980 44
Cereal division, including experimental plots, also salaries of officers in charge		$ 3,200 35	
LESS—Value of material supplied for feed	$270 77		
" potatoes supplied for seed distribution	398 30		
		669 07	
			2,531 28
Care of ornamental trees and grounds, avenues, hedges, &c.			1,071 49
Office assistance, including English and French correspondence and messenger service			4,483 40
Printing of office supplies and stationery			709 14
Arboretum			1,188 25
Distribution of trees and tree seeds			69 78
Care of green-houses, seed testing, &c., &c.			1,118 76
Dairy branch, including salary of dairyman			851 01
Contingencies, including $243.74 for roads			332 60
Telegrams and telephones			186 82
Steers, purchased for feeding experiments			1,109 89
Books and newspapers			132 26
Cleaning land (removal of stone, &c.)			59 66
			$ 36,441 24

Experimental Farm, Nappan, N.S.—Expenditure, 1906-07.

Feed for stock	$	875 75
Veterinary services and drugs		25
Seed grain, seeds, trees, &c		237 51
Implements, tools, hardware and supplies		94 81
Manure and fertilizers		43 16
Travelling expenses		52 70
Exhibition expenses		300 63
Blacksmithing, harness supplies and repairs		170 79
Salary of Superintendent		1,200 00
Wages, farm work, including experimental work with farm crops		1,277 25
Wages, care of stock		748 90
Poultry branch		163 85
Horticultural division, including experimental work with vegetables, fruits, forest and ornamental trees and flowers; also care of grounds and salary of officer in charge		645 29
Distribution of seed grain, potatoes, &c		76 00
Contingencies, including postage, $84.45; repairs to dykes, $45		166 20
Printing and stationery		16 63
Books and newspapers		24 42
Telegrams and telephones		22 32
Steers purchased for feeding experiments		2,188 37
Bee supplies		15 90
Draining		15 00
Office help and messenger service including delivery of mail, $90		180 00
	$	8,515 73

Experimental Farm, Brandon, Man.—Expenditure 1906-07.

Live stock	$	264 50
Feed for stock		10 30
Veterinary services and drugs		51 25
Seed grain, trees, seeds, &c		39 94
Implements, tools, hardware and supplies		212 68
Travelling expenses		11 15
Exhibition expenses		71 95
Blacksmithing, harness supplies and repairs		180 55
Bee supplies		23 06
Salary of Superintendent		1,200 00
Wages, farm work, including experimental work, with farm crops, &c		3,063 97
Wages, care of stock		548 25
Horticultural branch, including experiments with vegetables, fruits and flowers; also care of Arboretum and grounds		313 05
Forestry branch, including care of hedges		273 25
Poultry branch		87 15
Office help, including delivery of mail, $229.75		729 50
Distribution of seed grain, potatoes, &c		316 00
Distribution of trees and tree seeds		9 52
Contingencies, including postage, $95.80		103 60
Printing and stationery		39 94
Books and newspapers		22 45
Telegrams and telephones		60 85
Carried forward	$	7,632 91

Brought forward	$	7,632 91
Drainage and drain tiles		6 00
Manure and fertilizers		159 50
Steers purchased for feeding experiments		400 23
	$	8,198 64
Less—Value of grain supplied for grain distribution at Ottawa		1,042 30
	$	7,156 34

Experimental Farm, Indian Head, Sask.—Expenditure, 1906-07.

Live stock		$	16 25
Feed for stock			31 67
Veterinary services and drugs			58 60
Seed grain, seeds, trees, &c.			15 89
Implements, tools, hardware and supplies			490 97
Travelling expenses			11 85
Blacksmithing, harness supplies and repairs			94 15
Salary of superintendent			1,200 00
Wages, farm work, including experimental work with farm crops			2,654 52
Wages, care of stock			620 65
Horticultural branch			180 00
Poultry branch			51 66
Forestry branch, including hedges			68 25
Office help, including delivery of mail, $90			652 50
Distribution of seed grain, potatoes, &c.			139 66
Distribution of trees and tree seed			8 75
Contingencies, including postage, $372.33			407 63
Printing and stationery			47 19
Telegrams and telephones			29 85
Books and newspapers			3 50
Steers purchased for feeding experiments			292 85
Bee supplies			4 34
		$	7,080 73
Less—Proceeds of sale of steers purchased for feeding experiments	$ 780 00		
Value of grain supplied for grain distribution at Ottawa.	1,871 65		
			2,651 65
		$	4,429 08

Experimental Farm, Agassiz, B.C.—Expenditure, 1906-07.

Live stock	$	1 00
Feed for stock		55 90
Veterinary services and drugs		8 15
Seed grain, seeds, trees, &c.		67 52
Implements, tools, hardware and supplies		251 70
Manure and fertilizers		143 35
Travelling expenses		33 25
Exhibition expenses		296 70
Blacksmithing, harness supplies and repairs		140 83
Salary of superintendent		1,200 00
Carried forward	$	2,198 40

Brought forward	$ 2,198 40
Wages, farm work, including experimental work with farm crops, vegetables, fruit trees, vines, &c.	2,150 80
Wages, care of stock	404 50
Poultry branch	60 76
Forestry branch, including care of hedges	65 15
Office help	90 00
Distribution of seed grain, potatoes, &c.	83 00
Clearing land	17 50
Contingencies, including postage, $68	84 52
Printing and stationery	15 98
Books and newspapers	14 50
Drainage and drain tiles	69 12
Telegrams and telephones	2 60
	$ 5,256 83

EXPERIMENTAL FARM, LACOMBE, ALTA.—EXPENDITURE, 1906-07.

Purchase of land	$ 5,000 00
Horses	1,828 60
Implements, tools, hardware, &c.	2,428 99
Harness	229 40
Feed for stock	107 77
Travelling expenses	592 08
Salary of superintendent, 8 mos.	800 00
Printing and stationery	5 90
Contingencies, including rent of house for superintendent, $160	186 35
	$ 11,179 09

EXPERIMENTAL FARM, LETHBRIDGE, ALTA.—EXPENDITURE, 1906-07.

Horses	$ 2,475 00
Harness	584 60
Fencing	590 25
Implements, tools, hardware, &c.	2,775 80
Feed for stock	97 21
House and stable rent	218 16
Salary of superintendent, 8 mos.	1,000 00
Printing and stationery	73 30
Travelling expenses	223 45
Wages, breaking land, &c., &c.	55 80
Fuel for house for superintendent	52 75
Lighting for house for superintendent	27 27
Water for house for superintendent	11 26
Telegrams and telephones	14 00
Seed grain	14 76
	$ 8,213 61

NEW FARMS GENERALLY.—EXPENDITURE 1906-07.

Travelling expenses, &c., &c., of Director and Angus Mackay inspecting lands	$ 603 66

SUMMARY OF EXPENDITURE, 1906-07.

Central Experimental Farm	$ 36,441 24
Nappan Experimental Farm	8,515 73
Brandon Experimental Farm	7,156 34
Indian Head Experimental Farm	4,429 08
Agassiz Experimental Farm	5,256 83
Lacombe Experimental Farm	11,179 09
Lethbridge Experimental Farm	8,213 61
New Farms, General	603 66
	$ 81,795 58

*General Expenditure.**

Distribution of seed grain, potatoes, &c., from Central Experimental Farm, including labour, bags, printing, &c.	$ 5,286 23	
Value of grain from Brandon	1,042 30	
" grain from Indian Head	1,871 65	
" potatoes from Cereal Division, C.E.F.	398 30	
	$ 8,598 48	
LESS—Value of screenings charged feed for stock, C.E.F.	535 12	
		8,063 36
Entomological and Botanical Division, including salaries of officers in charge		3,566 67
Chemical Division, including salaries of officers in charge		4,104 55
Salaries general, including— Director, Accountant, director's secretary and assistant accountant		5,024 96
		$ 102,555 12
Printing bulletins and distribution of bulletins and reports	5,250 00	
LESS—Special sum in estimates for this item	5,250 00	
		$ 102,555 12

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* These items are put under 'General Expenditure' for the reason that they are incurred for general purposes.

SUMMARY OF STOCK, MACHINERY, IMPLEMENTS, &C., ON HAND APRIL 1, 1907.

CENTRAL EXPERIMENTAL FARM, OTTAWA, ONT.

19 Horses	$ 3,985 00
18 Ayrshire cattle	2,105 00
17 Guernsey cattle	2,100 00
18 Durham cattle (Shorthorns)	4,095 00
18 Canadian cattle	1,540 00
19 Grade cattle	720 00
138 Yorkshire swine	1,568 00
31 Berkshire swine	420 00
33 Tamworth swine	393 00
16 Shropshire sheep	300 00
10 Leicester sheep	190 00
Farm machinery and implements	3,375 40
Vehicles, including farm wagons and sleighs	1,158 00
Hand tools, hardware and sundries	1,203 05
Harness	605 30
Dairy department, machinery, &c	550 25
Horticultural and forestry departments, implements, tools, &c	871 35
Botanical department, implements, tools, &c	7 35
Poultry department, 329 fowls	694 75
Poultry department, implements, furnishings, &c	213 50
Bees and apiarian supplies	434 81
Chemical department, apparatus and chemicals	2,000 96
Books in several departments	875 53
Greenhouse plants, supplies, &c	2,449 00
Furniture at Director's house	1,000 00
Office furniture and stationery	1,543 25
Experimental flour mill and electric motor	450 00
	$ 34,848 50

EXPERIMENTAL FARM, NAPPAN, N.S.

8 Horses	$ 950 00
2 Holstein cattle	205 00
4 Yorkshire swine	120 00
25 Sheep	306 00
67 Fowls	73 75
Bees and apiarian supplies	42 15
Vehicles, including farm wagons and sleighs	400 75
Farm machinery	663 50
Farm implements	275 00
Hand tools, hardware and sundries	356 50
Harness	237 00
Furniture for reception room and bedroom for visiting officials	159 50
Furniture supplies and books for office	243 75
	$ 4,032 90

EXPERIMENTAL FARM, BRANDON, MAN.

12 Horses	$	1,580 00
4 Ayrshire cattle		180 00
6 Durham cattle		400 00
3 Guernsey cattle		135 00
11 Grade cattle		330 00
1 Tamworth pig		30 00
2 Berkshire pigs		45 00
2 Yorkshire swine		50 00
57 Fowls		57 00
Bees and apiarian supplies		183 70
Vehicles, including farm wagons and sleighs		575 00
Farm machinery		2,032 33
Farm implements		570 00
Hand tools, hardware and sundries		567 75
Harness		213 25
Furniture for reception room and bedroom for visiting officials		159 55
Furniture supplies and books for office		391 65
	$	7,500 23

EXPERIMENTAL FARM, INDIAN HEAD, SASK.

13 Horses	$	2,015 00
22 Durham cattle		1,575 00
19 Grade cattle		530 00
5 Berkshire swine		121 00
9 Yorkshire White swine		140 00
50 Fowls		54 00
Bees and apiarian supplies		55 00
Vehicles, including farm wagons and sleighs		498 00
Farm machinery		3,061 00
Farm implements		662 00
Hand tools, hardware and sundries		369 40
Harness		199 00
Furniture for reception room and bedroom for visiting officials		476 50
Furniture supplies and books for office		348 00
	$	10,103 90

EXPERIMENTAL FARM, AGASSIZ, B.C.

7 Horses	$	1,210 00
29 Durham cattle		1,635 00
15 Dorset horned sheep		153 00
3 Berkshire swine		105 00
3 Yorkshire White swine		90 00
35 Fowls		35 00
Bees and apiarian supplies		31 75
Vehicles, including farm wagons		161 00
Farm machinery		559 00
Farm implements		119 75
Hand tools, hardware and sundries		144 50
Harness		88 75
Furniture for reception room and bedroom for visiting officials		116 00
Furniture supplies and books for office		254 50
	$	4,703 25

EXPERIMENTAL FARM, LACOMBE, ALTA.

6 Horses	$ 1,828 60
Implements, tools, vehicles, hardware, &c.	2,429 00
Harness	229 40
	$ 4,487 00

EXPERIMENTAL FARM, LETHBRIDGE, ALTA.

10 Horses	$ 2,475 00
Implements, tools, vehicles, hardware, office furniture, &c.	2,775 00
Harness	584 60
	$ 5,834 60

THOS. M. CRAMP,
Accountant.

METEOROLOGICAL OBSERVATIONS IN 1906 AT THE CENTRAL EXPERIMENTAL FARM, OTTAWA.

TABLE of Meteorological Observations taken at the Central Experimental Farm, Ottawa, 1906: maximum, minimum, and mean temperature for each month, with date of occurrence, also, rainfall, snowfall, and total precipitation.

Month.	Maximum.	Minimum.	Range.	Mean.	Highest.	Date.	Lowest.	Date.	Rainfall.	Snowfall.	Total Precipitation.	Number of days Precipitation.	Heaviest in 24 hours.	Date.
	°	°	°	°	°		°		in.	in.	in.		in.	
January ...	28·68	10·17	18·51	19·92	48·0	23rd	—14·4	10th	0·26	9·25	1·18	14	0·35	18th
February ..	25·18	3·26	21·92	14·22	46·0	21st	—21·8	2nd	0·66	7·75	1·43	12	0·50	14th & 25th
March	30·83	12·87	17·96	21·85	47·0	29th	— 3·2	24th	0·98	7·50	1·72	10	0·92	27th
April	54·20	34·85	22·68	46·19	71·6	19th	17·0	7th	0·78	1·75	0·95	12	0·29	10th
May	64·94	40·14	24·80	52·54	89·8	18th	28·8	11th	1·88	......	1·88	15	0·45	25th
June	77·83	53·96	23·87	65·89	89·0	15th & 20th	36·6	12th	4·85	......	4·85	18	1·05	8th
July	82·34	56·04	26·29	69·18	93·6	22nd	44·2	5th	1·58	......	1·58	8	0·62	30th
August....	84·04	57·07	26·96	70·55	96·6	19th	43·5	15th	2·43	.....	2·43	9	0·74	20th
September.	75·86	47·86	28·00	61·86	92·0	12th	32·2	25th	2·53	......	2·53	7	1·56	29th
October ...	56·42	35·86	20·55	46·13	75·8	4th	24·5	12th	3·56	......	3·56	10	1·22	6th
November.	38·28	23·87	14·40	31·07	50·0	2nd	7·4	15th	1·01	7·75	1·78	11	0·61	26th
December.	20·70	3·23	17·46	11·96	38·0	15th	—25·2	8th	0·84	21·75	3·01	19	0·55	6th
	...	......	......	......	....	....	.....	....	21·36	55·75	26·90	145	....	....

Rain or snow fell on 145 days during the 12 months.
Heaviest rainfall in 24 hours, 1·56 inches on September 29th.
Heaviest snowfall in 24 hours, 5·50 inches on December 6th.
The highest temperature during the 12 months, was 96°6 on August 19th.
The lowest temperature during the 12 months, was—25°2 on December 8th.
During the growing season rain fell on 12 days in April, 15 days in May, 18 days in June, 8 days in July, 9 days in August, and 7 days in September.
September shows the lowest number of days on which rain fell, viz: 7.
Total precipitation during the 12 months, 26·90 inches, as compared with 32·42 inches during 1905.

RAINFALL, Snowfall, and Total Precipitation from 1890 to 1906, also the average annual amount that has fallen.

Year.	Rainfall.	Snowfall.	Total Precipitation.
	in.	in.	in.
1890	24·73	64·85	31·22
1891	30·19	73·50	37·54
1892	23·78	105·00	34·28
1893	31·79	72·50	39·04
1894	23·05	71·50	30·20
1895	27·01	87·50	35·76
1896	21·53	99·75	31·50
1897	24·18	89·00	33·08
1898	24·75	112·25	35·97
1899	33·86	77·25	41·63
1900	29·48	108·00	40·27
1901	29·21	97·25	38·91
1902	25·94	101·75	36·10
1903	26·43	85·00	34·92
1904	25·95	108·75	36·79
1905	23·71	87·25	32·42
1906	21·36	55·75	26·90
Total for 17 years	446·95	1496·85	596·53
Yearly average for 17 years	26·29	88·05	35·09

RECORD OF SUNSHINE at the Central Experimental Farm, Ottawa, for the year 1906.

MONTHS.	1906.			
	Number of days with Sunshine.	Number of days without Sunshine.	Total hours Sunshine.	Average Sunshine per day.
January	20	11	87·5	2·82
February	21	7	132·3	4·72
March	22	9	163·7	5·28
April	27	3	206·8	6·89
May	26	5	201·8	6·50
June	28	2	224·0	7·46
July	31	0	272·4	8·80
August	31	0	273·7	8·82
September	29	1	215·8	7·19
October	25	6	138·6	4·47
November	19	11	95·8	3·19
December	20	11	72·6	2·34

(Signed),

WILLIAM T. ELLIS,
Observer.

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